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OCT 26 1925

Electrical World

McGraw-Hill Company, Inc.

October 24, 1925

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The illustration shows a governor with motor driven fly balls and full automatic apparatus for non-attendant hydro-electric plants.

To start a unit the solenoid on the governor may be energized manually or automatically according to conditions. The governor will quickly open the gates to a predetermined point and as the speed accelerates to normal, the generator is automatically thrown on the line. This is all accomplished in an average time of thirty seconds.

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These governors are operating in automatic plants with units developing from 100 to more than 10,000 hp.

Woodward governors can be furnished in various types, from the smallest to the largest, to suit the conditions. Submit your governor problems to Woodward.

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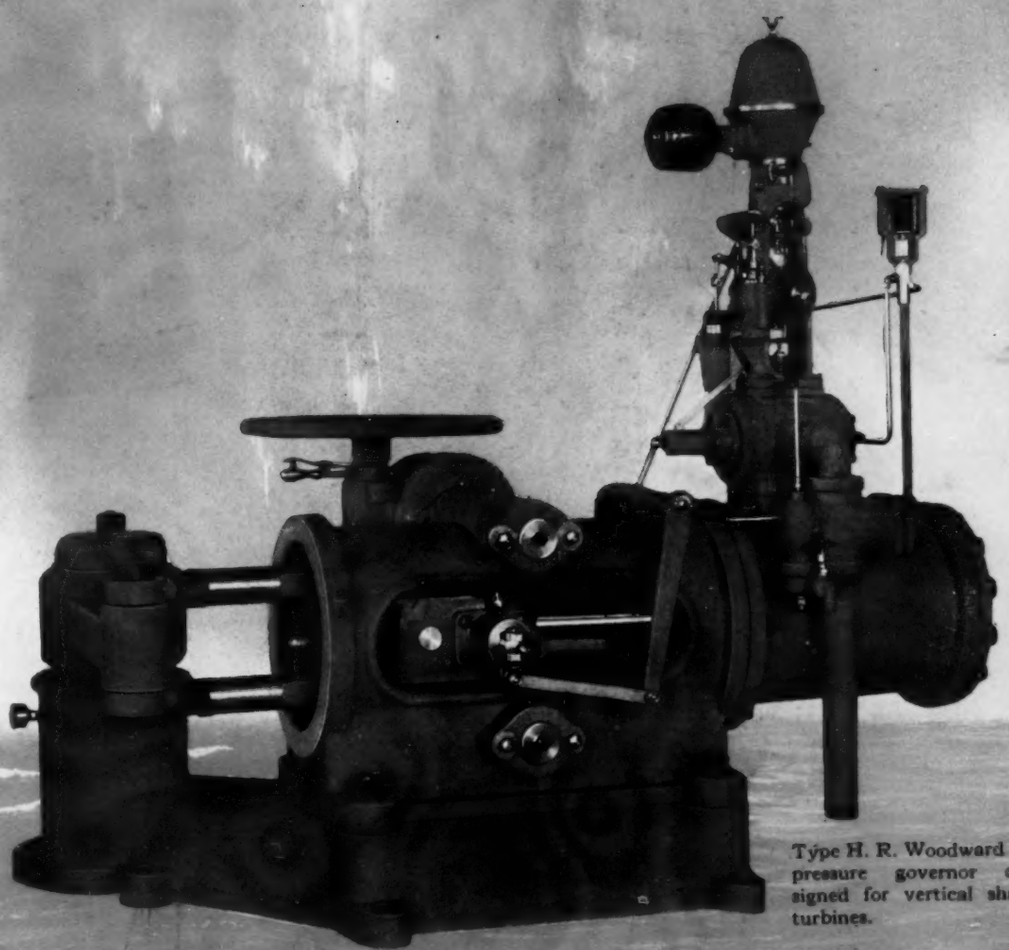

Type H. R. Woodward oil pressure governor designed for vertical shaft turbines.

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RAPID developments in the art of radio telephony have been accompanied by a corresponding demand for many special instruments to measure the minute and peculiar electrical forces encountered. These problems are of a special class in that they often involve measurement of high frequency current of very small values so that regular cataloged instruments seldom meet these particular requirements.

Here are several types of instruments with which your research engineers may not be familiar and yet may exactly fill a demand they have experienced in experimental work or in testing or inspecting your product.

Weston testing methods insure lower production cost, decrease the percentage of rejected material and improve the standard of quality in the finished product. Our nearest District Representative or we at this office will be glad to suggest ways in which special instrument equipment will be useful to you if you will acquaint us with your problems.

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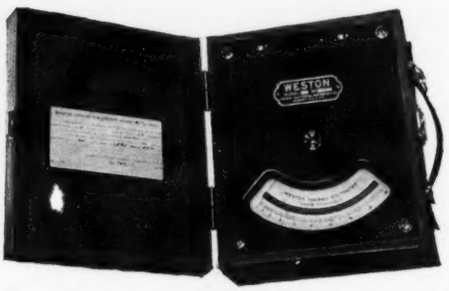

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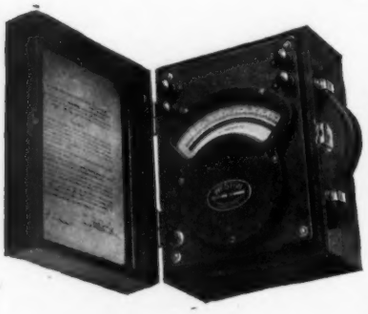

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Electrical World

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W. H. ONKEN, JR.
Editor

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A Motive and Cue for Better Service

HOW public service commissioners regard the electric public utilities of the country was revealed in Washington last week. During the meeting there of the National Association of Railroad and Utilities Commissioners a spirit of optimism prevailed. Heretofore the commissioners have criticised or damned with faint praise, whereas the atmosphere of the convention last week was surcharged with enthusiasm and commendation. The chief address of the meeting—that of Secretary Hoover—must have been as gratifying to the commissioners as it was to the electrical industry, to whose accomplishments it was largely addressed.

This spirit of good will is attributable to a better knowledge and appreciation of the electric light and power industry, and of all the men who have applied themselves to bringing this about none has done so more energetically or unselfishly than M. H. Aylesworth, the managing director of the National Electric Light Association. Facts presented convincingly and with perseverance cannot long be withstood, and the various state commissions have come to realize that the service of electric public utilities and their achievements constitute the best testimony to the efficacy of regulation extant. Small wonder, then, that Mr. Aylesworth was so well received and that the speeches and reports of the commissioners and others were so full of praise for the industry he represents. The latter is indeed doing well, and now that appreciation of the commissions and of the public is not lacking, it ought to—and we are sure it will—do still better.

Important Aspects of the Electrical Show

AS A PRACTICAL means of furthering public appreciation of refinements in the methods of utilizing electrical energy a better medium than the time-tried electrical show has yet to be found. The success of New York City's eighteenth annual Electrical and Industrial Exposition has afforded new proof, if any were needed, of the popularity of electricity in the public mind. Essentially the show was an exhibit of electrical home labor-saving devices, and those who visited the exposition this year were noticeably in a buying mood. They were not idle curiosity seekers. This, as pointed out by Arthur Williams, vice-president in charge of commercial relations of the New York Edison Company and president of the Electrical Show Company, can only be interpreted as indicating the public determination to acquire the relief from household drudgery which electricity offers.

In addition to these material benefits which accrue to the public and the electrical industry, the New York Electrical and Industrial Exposition this year has taken on a certain international significance. By a happy combination of circumstances an important delegation of French electrical executives and engineers is now visiting the United States to study American engineering practices and methods of utilizing electrical energy. The New York electrical show and other similar exhibits throughout the country offer the members of the delegation an opportunity to see in operation some of the methods whereby the use of electricity in the American home has become the most highly developed in the world. There can be little doubt that these representatives of France will carry back with them many favorable and lasting impressions of the domestic applications of electricity as exemplified in the electrical show, and these, if properly followed up, should open new market possibilities abroad for American electrical manufacturers.

The New England Power Pool

THE proposed participation of a number of the leading electric utility interests of the Northeast in the financing and development of the New England Power Company system marks an interesting step in centralization and interconnection of facilities for the more complete and flexible serving of the public in that geographical area. Readers of our news columns have noted that the scheme as announced does not at present involve the surrender of the corporate identities concerned, but a sharing in ownership and management which will give the participants a voice in the electrical development of the territory covered, a responsibility for its financing and an opportunity to work out around a common table many important problems in intercompany and interdistrict relations. All this fits in admirably with the need of New Englanders to think in terms of a regional group as advocated at the recent conference of New England governors and by the great commercial interests of the district.

At the bottom of this proposal lies the ever-increasing demand for power. The electric utilities of central New England, and especially those of Massachusetts, Connecticut and Rhode Island, are growing apace. The limitations of water-power development are beginning to be felt in this particular area, and the operating companies must look more and more to the large tidewater steam plants and to power imported across state lines for relief. In arranging for such supplies, in negotiating contracts between companies, in handling the actual transfers of energy between load centers and in financing for joint needs there are many advantages to be gained from the association of leaders proposed in the establishment of this sort of electrical power pool.

At this writing many details of the proposed financing have yet to be announced, and one or two companies that were invited to enter the pool are still to be convinced of its value to them as participants. Many millions of new money will presumably be put at work under the direction of the new grouping of interests in the very near future, and the initial overheads will be substantial, to say the least. It is unthinkable,

however, that the economics of the problem have been overlooked in relation to the amortization of such costs through increased operating efficiency, the co-ordination of investment in new facilities for generation and interchange, and, last but not least, through the ability to negotiate as a united group with others in the power market. These aspects of the matter, however, are problems for the bankers and engineers directly concerned and may be left to them. Broadly speaking, it is concordant with the best interests of the utility industry that its seasoned leaders shall work together in close harmony, and the progress of such movements as this is being studied with intelligent appreciation of their realizations and possibilities by central-station and power-company men throughout the land.

How Inadequate Wiring Applies Brakes to Electrical Progress

IN VIEWING the possibilities of electrical development it is not sufficient to consider that 40 per cent of all the homes in this country are wired for electric service. The adequacy of the wiring is a very important factor in electrical development, because the sale of lighting and labor-saving equipment, and therefore of electrical energy, depends largely upon whether or not there are convenient places to attach the appliances. In other words, inadequate wiring is constantly applying brakes to electrical development, and the power of the brakes is in inverse relation to the efficiency of the wiring. The standard has been greatly improved in the last two or three years, but the average for all wired homes in this country is still very low. That it is far out of line with even the present requirements for convenient and adequate use of electricity is shown by the series of articles now being contributed to the ELECTRICAL WORLD by M. Luckiesh.

The average number of convenience outlets in the wired homes of the country is 3.4 per home. The average number in various rooms at the present time is as follows: Living room, 0.82; dining room, 0.48; kitchen, 0.49; bedroom, 0.41; bathroom, 0.17. No room averages as much as one convenience outlet. None the less, the most conservative wiring specifications should provide at least one such outlet in each of these rooms and about three in the living room.

Portable lamps will not be purchased if there is no place to attach them, and perhaps in most cases convenience in connecting them exercises a vital influence upon their purchase. With an average of less than one convenience outlet in the living room and less than one for every two bedrooms, it is obvious that inadequate wiring is applying brakes to the purchase or use of portable lamps. Since at least one-half the kitchens and dining rooms are without convenience outlets, it is clear that the purchase or use of toasters and other appliances is largely inhibited. With only one bathroom out of six possessing a convenience outlet, it is reasonable to assume that householders do not often purchase or use electric heaters and other appliances even when they would like to enjoy them. Thus one might continue throughout the home.

The average total number of convenience outlets and fixture outlets in wired homes at the present time is about sixteen. The most conservative specifications for providing the householder with convenient electric service for lighting and labor saving demand twice as many fixture outlets and three times as many convenience outlets as exist today in wired homes. These and many other important points in increased lighting sales are discussed by Mr. Luckiesh.

Electrical Interest in the Hardware Men's Convention

TIME was when the annual convention of the National Hardware Association would be a matter of no concern to the electrical industry. But a glance at the program of this year's meeting shows that electricity has become important to the hardware man. Two addresses by men of the electrical industry were prominently scheduled and three major discussions were provided for—one on electrical appliances and two on radio.

If electrical merchandise is so attractive to the hardware industry that it takes an important position in its national convention, is it not time that the electrical manufacturers, jobbers, dealers and central-station companies began to give a little more attention to the part which the hardware store is apparently planning to play in appliance distribution?

The matter should not be considered from a competitive point of view, because there cannot be too many outlets for electrical appliances once the American home has adopted them completely as standard equipment. Rather, at this stage, thought should be given to helping the hardware store to get started right and to harmonizing the competitive relations of the electrical and the non-electrical merchant, that they may both prosper through co-ordination, expanding their efforts in constructive market development rather than dissipating them in unfriendly strife.

Classification of Ice Companies as Public Utilities

THE recent action of the Oklahoma Corporation Commission in designating ice companies as public utilities and ordering that their business shall be under the control of the commission may come as a surprise to some utility executives and may to others presage the coming of an important interrelation between the electrical and the ice-making industries. Even a cursory examination of the nature of the manufacture and distribution of ice as a business will reveal the condition that enables this industry to be classed as a public utility. Particularly in the warmer latitudes and in those communities where families and institutions demand a regular supply of ice as a necessity, the control of the manufacture and sale of ice may readily be considered a proper function of the state. The Oklahoma commission has already issued several orders authorizing operation of ice properties by utility companies and has recently granted the first application of an ice company for increased rates. The classification of ice companies as public utilities may cause the management of these companies to appreciate better the problems of the electric utility and should hasten the co-operation of these two industries in the development of electrically operated refrigeration units for home and commercial use. It may also make possible the elimination of any controversy concerning ice

versus electric refrigeration and even, indeed, pave the way for a united front in the cause of more and better refrigeration for every home.

Approached from another angle, the action of the Oklahoma commission calls attention to the possibilities of combined operation of electric and ice utilities by the same company. Recent estimates place the investment in the ice business of the country at more than a hundred million dollars, with a potential load of more than three billion kilowatt-hours. With a ratio of investment to gross earnings of two and one-half to one for the ice business compared with four to one for an electric utility, the combined operation of ice and electric properties would appear to be financially practicable.

Holding-Company Finance and Speculation

THE expansion of utility holding companies, effected largely by capitalizing equities in underlying companies, introduces possibilities for failure as well as opportunities for economies in finance and operation. For some time there have been ample money available, a good market for securities and good earning records for underlying properties. It is natural under these favorable conditions that far-sighted utility executives should consolidate utility properties to effect economies in management and finance, to take advantage of the diversity in loads and to benefit from the earnings incidental to the production and distribution of electricity in large quantities.

But two corollary movements have also occurred as a result of this trend. The buying and trading of properties results in material increases in their market price and speculative interests enter into the field for selfish purposes and take advantage of a temporary situation to do things which are unwise and unconstructive. So long as underlying properties continue to show good earnings and so long as a favorable security market and good public relations continue, the most flimsy holding company structure can exist; but there always comes a day of reckoning, and to guard against disaster the electrical industry should move conservatively lest the good holding companies as well as the bad suffer and the entire industry lose public confidence.

A shrinkage in the earnings of underlying properties through an industrial slump is inevitable over a period of years, and it is the unprosperous cycle that should be considered in the consolidation of utility companies. An underlying property with a surplus and a good earning record may be absorbed by a holding company at an inflated price and the securities issued may earn a return because of economies obtained through the consolidation. But those engaged in such dealings should realize that the economies should be capitalized at a conservative figure, that the rates charged by the underlying company are subject to regulation, that commissioners fix rates on a conservative investment basis and that an industrial depression may decrease earnings materially. The natural result would be unfavorable financial and public reaction whereby the credit of the utility and its standing with its community would be jeopardized. Some of these factors were admirably stated by Colonel L. P. Ayres in the October 17 issue of the ELECTRICAL WORLD, and, as has been suggested by many central-station leaders, the whole industry should interest itself in this situation so that speculation in the stocks of utilities may be kept within bounds. Otherwise harm is sure to follow.

Sell Industrial Lighting to the Workers

PROGRAMS for the adoption of better practices among industrial organizations have always met with a fuller measure of success when the workmen involved have been thoroughly convinced of the benefits they will receive from the successful operation of the new plans. In selling industrial lighting emphasis is generally placed on the possibilities for increased production, but the workmen themselves are not likely to become enthusiastic over increased production if it means increased effort for them. While improved industrial lighting generally means increased production, this important fact should be impressed upon the workmen: Better lighting will enable them to see objects more quickly, with less eye strain, and will eliminate many motions that mean waste effort. Any increased production achieved will result from greater ease in performing tasks. Better lighting can be profitable for the factory owner only to the degree to which it improves working conditions, reduces strain on workers and makes possible greater production with less waste effort.

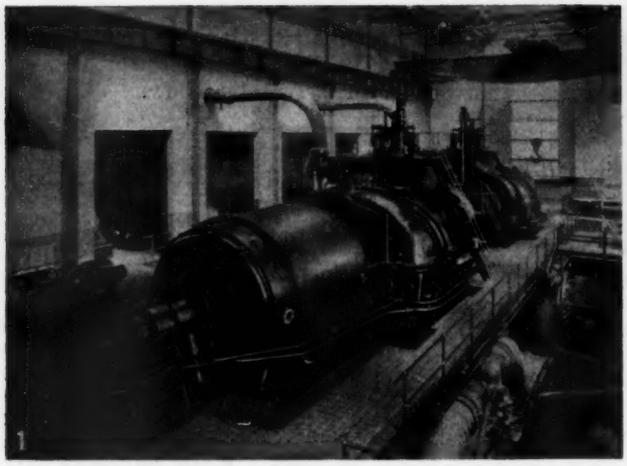
This effort to sell industrial lighting to the workers as well as the management should apply not only to the advertising but also to the efforts of the salesmen, who would do well to demonstrate to individual workers the benefits that will come to them from improved lighting in the workshops where they are employed.

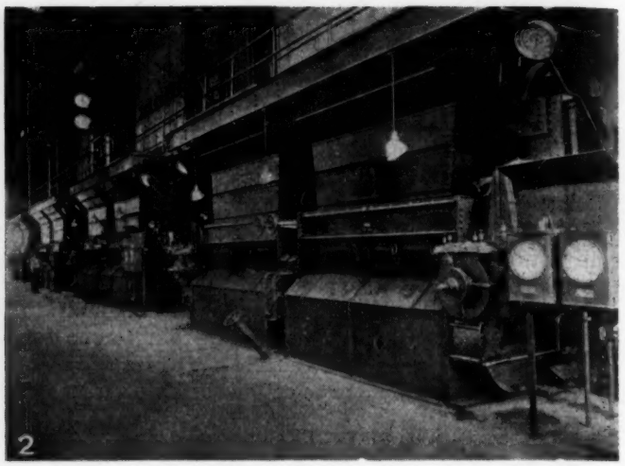
Why Not Discard the Term "Power Factor"?

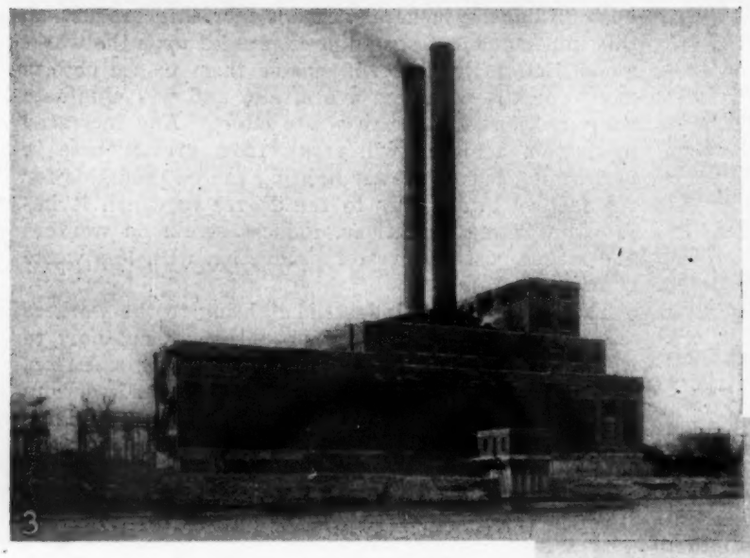
AN ATTEMPT to analyze or compare power-factor conditions shows how futile it is to employ the term "power factor." Its use in most analyses requires too many qualifying appendages. As a result, when one has finished an analysis he wonders whether he should have used average or weighted power factor or whether either is the desirable unit.

"Kva." and "kva.-hours" are much more useful if they can only be recorded in the form desired. Considering "kva.-hours" alone, its proportion to "kw.-hours" on a peak-load day, during the peak-load hour, or on an average summer day, would indicate what excess voltage drop and excess equipment, including apparatus and circuits, was made necessary by poor power factor alone. The ratios of the squares of these values would indicate the relation of heat losses under different conditions of operation. By trigonometry the reactive kva. could always be obtained to ascertain what corrective kva. is necessary on any feeder. While the power factor may vary with different loads on apparatus, the reactive kva. will always be approximately the same with the same equipment connected.

What is to prevent electrical engineers from talking about magnetizing current, reactive kva. or kva.-hours, instead of continuing the use of the old term "power factor," which is valuable for any set of conditions, but leads into a maze and is too indefinite for most studies, whether they be technical, economic or financial?

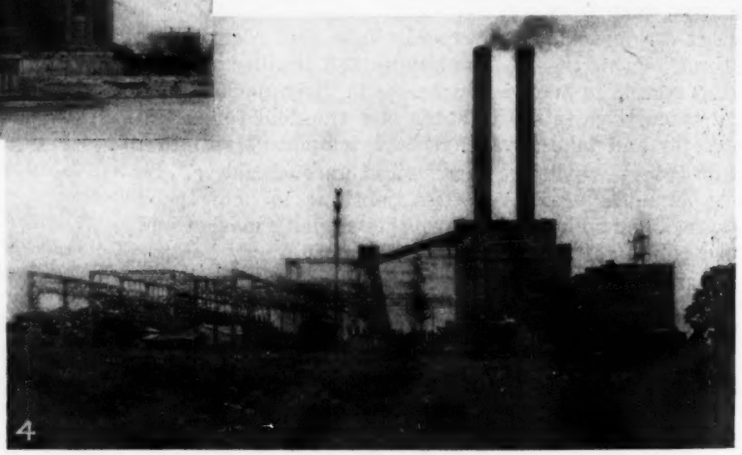






Superpower Steam Plant Development in Indiana

NINE miles below Terre Haute, Ind., is the Wabash River station of the Indiana Electric Corporation, located in the heart of the coal fields and designed for an ultimate capacity of at least 100,000 kw. The plant began operation in July, 1924, and has just been enlarged by its builders, Stone & Webster, Inc., Boston. Eight 1,726 Babcock & Wilcox boilers operating at 350 lb., with chain-grate stokers, and three Westinghouse 20,000-kw. turbo-generators are installed. A 75-mile, 132-kv., two-circuit steel-tower line connects the plant with the Indianapolis district and ties the station into a system serving more than seventy municipalities.



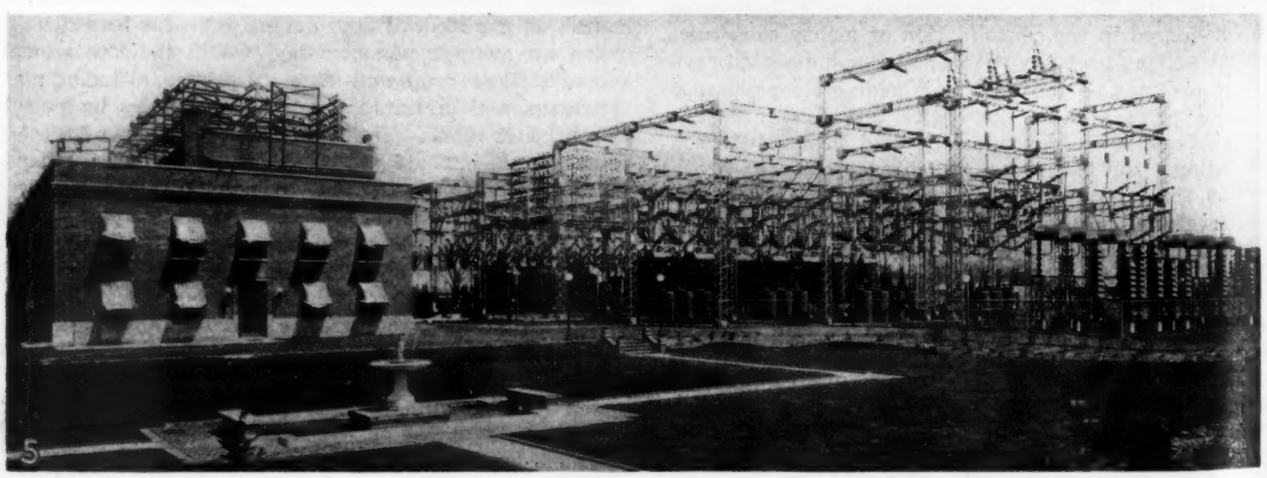
1. Two of the 20,000-kw. units in the turbine hall.

2. Firing aisle, stoker fronts, lighting units and combustion recording instruments in boiler room.

3. Exterior of Wabash River station, screen house and electrical bay in foreground.

4. 66-kv. and 132-kv. switching yards at left of station, boiler house and electrical bay.

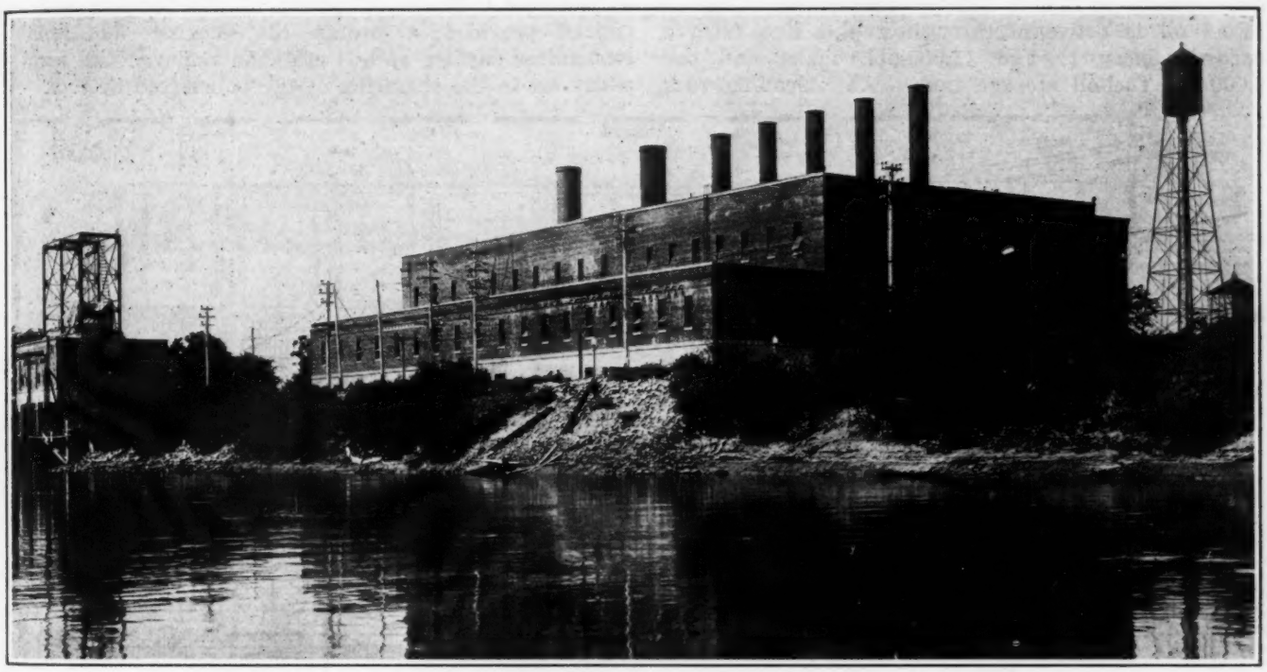
5. Lenore substation, 132-kv. switching yard and switchhouse near Indianapolis, with unusually attractive landscape gardening.



Keeping a Modern Station Up to Date

How, in the Period of Just Five Years, Changes Were Made in the Generating Station from Time to Time to Meet Changing Operating Conditions and Keep It Up to the Desired Standard of Reliability of Service, Economy of Operation and Simplicity

By JAMES F. BROWN
Chief Engineer Oklahoma Power Company, Tulsa, Okla.



TULSA GENERATING STATION AND INTAKE HOUSE

VARIOUS discussions have been presented on the engineering thinking that lies back of the design of new generating stations, and occasionally some engineer is kind enough to relate his experiences with plants after they have been in operation a while. However, few reports are seen on the experiences and changes in conditions under which a plant operates, which call for gradual changes in any plant, no matter how well designed initially. To stimulate more exchange of experiences of this kind, some with the Tulsa power station of the Oklahoma Power Company during the relatively short space of five years will be presented to indicate how the initial design problems were handled, how changes were made and extensions provided for increasing load and altered operating conditions, and particularly the evolution of solutions for fuel, boiler-feed and condensing water problems.

The Tulsa power station of the Oklahoma Power Company was built to handle the increase in the Tulsa load of the Public Service Company of Oklahoma, a related organization, and also the base load of the Oklahoma Power Company's properties at Okmulgee and Henryetta, Okla.

The greatest problem to solve was that of water supply for boiler-feed and condensing purposes. A change in the fuel situation after construction of the plant was started also left its mark in the design and extension of the plant.

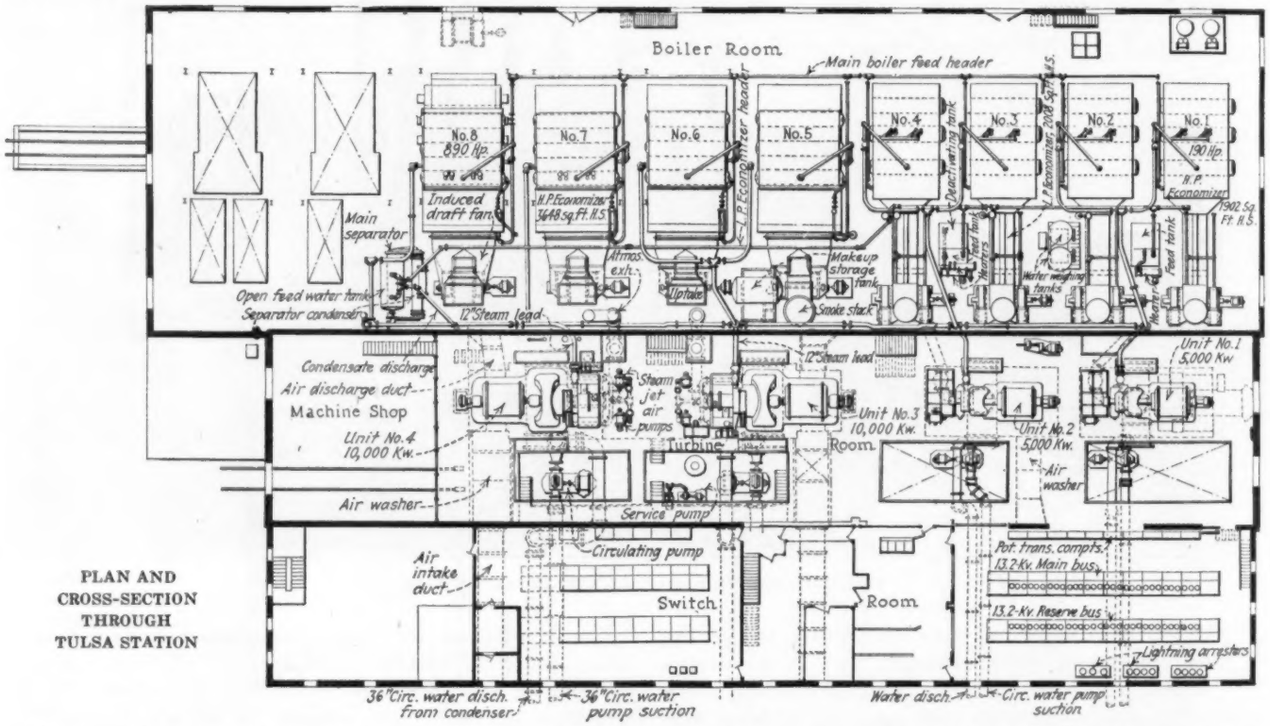
Construction of the station was begun in September, 1919, the first section housing two 5,000-kw. turbo-generators and three 675-hp. boilers with space for a fourth boiler, which was installed in August, 1921. The second section, consisting of a 10,000-kw. unit and three 890-hp. boilers, was put into service in the winter of 1922-23. The third and final section, which consists of one 10,000-kw. turbine and three 890-hp. boilers, is very nearly completed, with the exception that only one boiler is being installed. Space is provided for two additional boilers.

Plans for the first section provided for the use of coal, as the relative prices of coal and oil in 1919 made coal the cheaper fuel. The subsequent fall in the price of fuel oil occurred before the installation of coal-burning apparatus was under way, and a quick change of plans was made to take advantage of the cheaper fuel. Tulsa is the center of the oil fields of Oklahoma and fuel oil is readily available from adjacent refineries. There are also a number of coal mines near Tulsa, as well as at a number of points in eastern Oklahoma. Consequently the plant is well situated to use either or both fuels and take advantage of favorable price of either. Until recently, fuel oil has been the cheaper, and the station has burned fuel oil exclusively. The price of fuel oil, however, has been slowly but steadily rising since 1922, and the fact was recognized that sooner or later it would be necessary to change to coal.

Consequently one coal-fired boiler was installed in the third section of the station. The design of the boilers is such that installation of stokers can be readily accomplished under the seven oil-fired boilers in the first two sections should the relative prices of the two fuels warrant the change.

Mechanical oil burners are installed under all oil-burning boilers, seven burners with size 40-20 sprayer plates being installed under the 675-hp. boilers and nine under the 890-hp. boilers. This complement of burners is sufficient for boiler operation at 300 per cent rating, with 225 lb. oil pressure. The boilers are operated normally at 175 to 225 per cent rating.

Fuel oil is delivered through a pipe line from a nearby refinery to two 11,000-bbl. tanks and one 55,000-bbl. fuel-oil storage tank. An unloading rack



PLAN AND CROSS-SECTION THROUGH TULSA STATION

is also provided for oil shipped in by rail. Two 10x12-in. motor-driven triplex pumps are connected so that fuel oil may be transferred from one storage tank to another, pumped from tank cars to storage, or pumped from storage to a 100-bbl. auxiliary storage tank near the boiler room. From this tank the oil is pumped by one of two vertical duplex steam pumps to the burners. The density of fuel oil turned out by the refineries has gradually changed from 20 deg. Baumé in 1921 to 14 deg. at present. The heavier oil requires a temperature of 220 deg. at the burner for proper atomization, and a temperature of over 75 deg. must be maintained to insure successful pumping. Each storage tank and the auxiliary oil tank are therefore provided with steam-heating coils, and all suction piping is installed in steam-heated pipe ducts, the fuel oil passing finally through two exhaust steam heaters, located between the pumps and the burners.

All boilers are of the Stirling type. The first four boilers having 6,750 sq.ft. each were provided with individual low-pressure 2,008-sq.ft. (heating surface) cast-iron economizers. The flue gases leaving the integral economizer passed through the low-pressure economizer, entered the induced-draft fan at the rear and were then delivered to the stack. However, tests made on the cast-iron economizers showed that the heat they absorbed ranged from 2¾ per cent at 166 per cent rating to only 4 per cent at 290 per cent boiler rating. The saving in fuel resulting from these economizers did not offset the fixed charges, so they were omitted in the boilers of the second and third sections. In addition, the necessity for pumping water through them at low pressure complicated the feed-water system and rendered control of feed-water temperatures difficult at high ratings. If the temperature of the water leaving the economizer exceeds 212 deg., steam is lost at the vent. The development of the Duratex economizer provided a means of securing additional economizer surface at less cost and removed the complications in the operation of the boiler-feed system.

The boilers of the second and third sections contain 8,900 sq.ft. of heating surface, thirty-two tubes wide, and are of the same design as the first four except that the steam drums are all at the same elevation and Duratex high-pressure economizers were substituted for the integral economizers. The economizers of boilers No. 5 and No. 6 contain 3,648 sq.ft. of heating surface and those of boilers No. 7 and No. 8 contain 3,948 sq.ft.

Securing the proper water for boiler-feed and condensing purposes was the greatest problem. The only available source was a broad, shallow stream with a sandy bottom and shifting current. Carbonates and sulphates of magnesium and calcium, magnesium chloride, a high sodium-chloride content, and a large proportion of organic matter are present in the water. Furthermore, it is heavily laden with débris of various kinds—grass, roots, leaves, waterlogged sticks and logs—and is covered on the surface with a layer of asphaltic residue from refineries and oil wells up the river.

To make the water at all suitable for boiler-feed purposes, three shallow wells were sunk along the river bank into which the river water filters through the sand. While the well water is comparatively free from

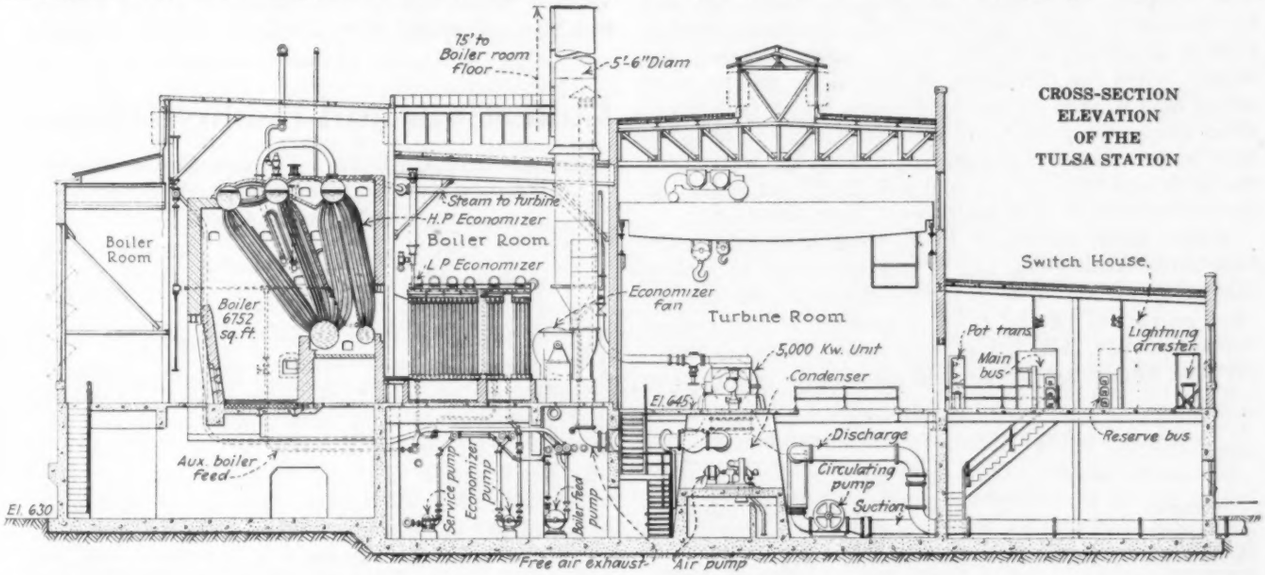
organic and suspended matter, the amount of solid matter present made evaporators imperative. For the first section of the plant, therefore, a quadruple-effect low-heat-level evaporator taking steam from the exhaust system was installed. Considerable trouble was experienced at first with the evaporator operation due to the formation of a dense hard scale on the evaporator tubes which reversing failed to remove. This scale cut down the capacity of the evaporator below station requirements, and could not be removed with acid (the only practical method) often enough to keep up the capacity. Furthermore the water primed badly in the evaporator and carried over a sufficient amount of scale-forming solids into the boilers to prevent operation of these at even moderate ratings without losing tubes. Consequently a Scaife intermittent, cold-process water-treating plant was installed between the well-water supply and the evaporator, the intermittent system being selected because it permits accurate chemical treatment of each tank of water.

The use of treated water overcame successfully the scaling of the evaporator. Excessive priming and resultant loss of boiler tubes was partly overcome through the use of treated water and partly as a result of increased experience of the operators in handling the evaporator. Treated water is also used in the coolers, for sealing pumps (except condensate pumps), for bearing cooling water, in air washers and at other places where small quantities of water are used and where raw water would cause trouble due to corrosion, scaling and stopping up of pipes.

As the steam-generating equipment was increased, the evaporator became unable to supply enough water at times. To provide more distilled water, piping changes were made which permit operation either as one quadruple-effect evaporator or as two double-effect evaporators. Double-effect operation will supply ample make-up water for a load of 30,000 kw.

The first year's operation clearly demonstrated that reliable service depended on the proper control and supervision of the quality of all water affecting boilers. Pitting of steel economizer tubes appeared at a very early date. Efforts were made to combat this by maintaining the highest possible feed-water temperature, removing V-notch meters, closing open feed-water tanks, and discharging water into tanks and reservoirs under the surface of the water, but with only partial success. Therefore a deactivator using finely divided iron as the oxygen-removing agent was installed in the make-up line to the feed tank, but it failed to remove the corrosive element completely, due to the impossibility of maintaining in the bed of iron shavings a uniform resistance to water flow and of preventing short circuiting of the water through the reagent. The oxygen content of the feed water was not reduced below 0.3 c.c. of oxygen per liter of water. By the use of this system, economizer corrosion was largely but not completely checked. With the third section of this station an Elliott deaërator is being installed of sufficient capacity to deaërate the entire boiler-feed water, which, it is expected, will completely solve the economizer corrosion problem.

Three of the four boiler-feed pumps installed are steam driven, as are also two fuel oil pumps and two of the three service water pumps. The amount of exhaust steam supplied by these steam-driven auxiliaries is a little more than sufficient to serve the evaporator. In the first section of the plant the heat required for heating the feed water was supplied by the low-pressure economizers. In the second and third sections all the auxiliaries installed are electrically driven, so the third and fourth units are provided with connections for bleeding steam from the third and fifth stages, which is utilized for heating feed water. In case insufficient steam is supplied by the steam-driven auxiliaries, the steam can be extracted from the third stage and passed into the exhaust steam piping for use in the evaporator, or into the open feed-water heater, which at the present time is being installed in the boiler-feed system just ahead of the Elliott deaërator.



CROSS-SECTION ELEVATION OF THE TULSA STATION

The two 5,000-kw. turbines installed in the first section of the plant are five-stage, 3,600-r.p.m., General Electric machines. The last two 10,000-kw. turbines are nine-stage machines operating at 1,800 r.p.m. All are designed for operation with a steam pressure of 225 lb. per square inch gage and a total steam temperature of 600 deg. F.

Circulating water for the condensers is drawn from the Arkansas River, but on account of the large quantity of débris in the river at certain seasons, traveling screens were necessary. Four Chain Belt traveling screens, 34 ft. 6 in. long (which provides for a maxi-

mum river rise of 20 ft.) were installed in the intake house, where a structural steel tower permits hoisting the traveling screens for repairs. Cast-iron piping is used for the circulating water. Flanged piping was used for the units of the first section, but settling in the sandy soil caused some breakages, so with later units a change was made to bell-and-spigot joints on the discharge piping and flanged joints with a number of copper expansion joints in the suction line. No breakages have occurred in the piping thus designed.

At times it is impossible to operate with circulating water taken directly from the river due to excessive débris, shifting of the river channel, formation of crystal ice during the winter, freezing over of the river, or an inrush of sand into the intake wells. For operation during such emergencies it was necessary to install spray ponds. Sufficient spray-pond capacity is now installed for winter operation at 20,000 kw. and for summer operation at 10,000 kw. The spray pond is located upstream near the river banks. During the winter, when the formation of crystal ice on the river would tend to stop up the condensers, water is diverted from the spray ponds just above the river intake, the heat in the water being sufficient to keep the water near the bank and above the intake well free from ice except during extremely cold weather of long duration.

Muntz metal condenser tubes were installed in the first three condensers, but it was necessary to replace the tubes of the first two condensers at the end of four years and of the third condenser at the end of two years, Admiralty tubes being used. It was expected that the Admiralty tubes would give longer service than the Muntz metal under the conditions existing, so the specifications for the fourth condenser provided for the installation of such tubes. On the same reasoning, an evaporator condenser was retubed with Admiralty metal tubes, but it was found that these tubes had a life of only four months. After going exhaustively into the subject as to the best tubes to use with Arkansas River water, it was decided to replace the Muntz metal tubes of the third condenser, which failed at the end of two years, with hard-drawn arsenical copper tubes. The tubes of all condensers are expanded at one end and packed at the other. This construction has given excellent satisfaction, no trouble whatsoever having been experienced on account of the expanded joint.

The mechanical and electrical layout, as well as the buildings, was designed by Sargent & Lundy in collaboration with James H. Buell, vice-president and manager of production of the Oklahoma Power Company, who also supervised all construction work in the field.

TABLE I—TYPICAL DAILY WATER TEST REPORT

Sample	Grains per U. S. Gallon—Caus-ticity	Alka-linity	Chlorine	Hard-ness	Oxygen (C. C. per Liter)	Tur-bidity
Turbine condensate	0	0 11	0.29	0	0.33	...
Boiler feed	0	0 20	1 05	0	0.39	...
Treated water	5.8	7.6	99.0	0.45	....	...
Raw water	0	14.6	88.0	53.0	....	...
Boiler No. 4	15.7	17.5	80.4	1.87	....	130
Boiler No. 5	7.0	11.7	81.6	1.48	....	800
Boiler No. 6	5.8	8.7	90.0	1.95	....	900
Boiler No. 7	4.1	7.6	43.7	.70	....	350
Clear Well						
Morning shift	....	.....	7.0	.....	....	...
Day shift	Trace	0.35	5.6	0	1.28	...
Evening shift	....	.....	5.6	.....	....	...
Evaporator Sludge						
Morning shift	....	.....	151	.....	....	...
Day shift	....	.....	242	.....	....	...
Evening shift	....	.....	126	.....	....	...
Evaporat r Discharge						
Morning shift	....	.....	0.93	0	....	...
Day shift	.....	.....	0.82	0	....	...
Evening shift	....	.....	1.28	.....	....	...

TABLE II—TYPICAL CHEMICAL ANALYSES OF WATER SAMPLES FROM TULSA POWER STATION

	Grains per U. S. Gallon— Raw Water	Treated Water	Evap. Discharge	Turbine Condensate	Boiler Feed	Boilers No. 2	Boilers No. 3	Boilers No. 4
Calcium bicarbonate	16.33	.....	0.06	....	0.12	.....	.....	.....
Calcium carbonate	.....	1.34	....	....	.....	1.98	0.29	0.41
Calcium sulphate	20.12	.....	0.23	....	.....	.....	.....	.....
Calcium chloride	4.61	.....	0.12	....	.....	.....	.....	.....
Magnesium carbonate	.....	0.70	....	....	.....	.....	Trace	.....
Magnesium bicarbonate	.....	.....	....	....	Trace	.....	.....	.....
Magnesium chl ride	10.32	.....	....	....	.....	.....	.....	.....
Sodium carbonate	.....	1.69	....	....	.....	2.04	17.73	7.47
Sodium bicarbonate	.....	.....	....	....	0.99	.....	.....	.....
Sodium sulphate	.....	17.27	....	....	0.29	7.35	14.41	10.44
Sodium chloride	109.08	89.25	6.94	0.29	0.12	36.75	120.75	68.31
Sodium hydrate	.....	.....	....	....	.....	3.03	.....	6.01
Iron oxide and alumina	0.64	0.23	0.06	....	0.06	0.41	0.41	0.29
Silica	2.74	1.71	0.12	....	0.06	0.82	2.98	0.82
Organic matter	24.83	0.88	0.35	....	0.29	2.92	2.63	3.97
Total solids	188.57	112.53	7.88	0.29	1.93	55.30	159.20	97.72

Collections and Public Relations

Cashiers and Collectors Possess Great Power to Help or Hurt and They Must Be Selected with Extreme Care

BY A. B. WOLLABER
District Manager Southern California Edison Company, Pasadena, Cal.

NOTHING offers a greater opportunity for disagreement, hard feelings and the breaking of friendships between men than money. Because of this fact electric light and power companies should be very careful in the selection of their representatives who are charged with the responsibility of collecting bills from their customers. No one should ever be assigned to the cashier's window or as a regular collector in the field who has not had impressed upon him a full measure of his responsibility to those the company serves.

The more open the office is, the freer from cashiers' windows and small openings through which the customer transacts business, the greater the opportunity the company has to make a favorable impression in its dealings with its customers. No one should ever be selected for the important position of cashier who is not inherently courteous. Courtesy is the refining oil that lubricates daily affairs, and the more of it that is given away the more one has on hand. Neatness is another element that enters into this important work. Every one is more or less impressionable and apt to judge the institution by those with whom he comes in contact. It cannot be said that a discourteous or slovenly person is the proper representative to meet a company's customers, yet, unfortunate to relate, at times this condition exists.

To make the customer feel that it requires an effort to check up his bill and to assume an air of indifference to what he says both tend to undo the important work in public relations that the industry is striving to accomplish at this time. Those in the office should make the customer feel that he has conferred a favor on the company in personally coming into the office. Wherever possible he should be addressed by name, and under no circumstances should an employee fail to thank him when he pays his bill.

The officer in charge of the collection department

should frequently look into the methods of those under him. He should occupy a position in the office where he can readily observe the attitude of the clerks and those they are serving, and he should not hesitate immediately to make or recommend changes in rules or personnel whenever necessary to promote harmonious relations with the public. How the customer comes into an office is not so important as how he goes out, and every one charged with the collection of accounts should measure up to the full responsibility of his post at all times and make the most of every opportunity to make friends for his company—real and lasting friends who will defend it when it is subject to untruthful statements or subtle attacks. It cannot be too strongly emphasized that the customer often gains his entire impression of the company from his contact with employees at the counter or the cashier's window.

TWO ILLUSTRATIONS

A certain editor in a Western city who had constantly fought the local electric company was never known to come to the company's office, notwithstanding that he was apparently on friendly terms with the local representative. Later the company built a new office and this editor was induced, among others, to call and inspect it. He did not say a great deal on his first visit, but he came back in a few days and this time he said to the local manager: "I like to come into this office because there is such an atmosphere of good feeling and efficiency. It fairly smiles on you, and when a fellow gets in here he hates to leave." A tangible evidence of his change in attitude was that his editorials and articles against the company ceased, and he became its consistent friend and supporter because of his reception and the reception of other customers of the company when they called at the office to make an inquiry, pay a bill or transact business of any kind.

Another example—a rather deplorable one, but one of a kind met with almost daily in dealing with various lines of business—came to the attention of the same manager. He met one of his good customers and in the course of a general conversation was asked this question: "Where did you get that clerk you have in your front office?" The customer was informed that the man was an old employee and one who was regularly employed in meeting the public. The manager asked the consumer just why he had made the inquiry, and the latter replied: "Well, he always has an expression on his face which seems to say to me, 'I wish you wouldn't come in here and bother me about the payment of your bills.'"

In a case like this one may well ask where the profit to the company from such an employee comes in. Of course, this employee did not wish to create such an impression, but the customer gained that feeling from his attitude and proved without doubt that he was holding a position for which he was not fitted and thereby hurting the company. A manager's interest should be centered on the place where the public meets the company, for there is where the danger lies.

THE COLLECTOR

The collector who goes from house to house to collect the company's bills affords another point of contact that offers opportunities of magnitude. Such employees are called upon to use tact and diplomacy in their work, because it often happens that in the collection of bills they have to deal with conditions over which they have no control, and many times it is necessary for them to collect overdue accounts that have become embarrassing not only to the company but to the consumer. These employees should be impressed with their responsibility to the utility business before they are sent into the field, because, as has been previously said, nothing offers a better chance for the breaking of friendships than money matters. The collection of bills is an extremely delicate matter that should be intrusted only to those in whom the company has the utmost confidence. A collector can so conduct himself as to be a shining example of good will and courtesy, thereby bringing credit upon the company he represents, or, on the contrary, he can make himself obnoxious throughout the territory he serves, thereby bringing down unjust criticism upon his company.

An instance came to the attention of the writer not long ago where one of the customers of a large utility company doing business in the West called the manager on the telephone regarding a person who had come to her door claiming to represent the company and demanding the immediate payment of her bill. She said: "I felt it my duty to call you up and tell you that there is an impostor in the field trying to make collections from your customers. I knew the minute he spoke that he was not from your company."

What confidence this consumer had in the company's business methods, and what a fine impression must have been made on her by its regular representative! An investigation proved that this man had visited the homes of a number of customers and had endeavored to make collections, but had been refused in all instances because of his attitude. It is this type of work that the utility business needs. Here we have an example of work done by a careful, conscientious collector who recognized his responsibility to his company and the industry. By his work he had built up such confidence in the company and himself that its patrons at once detected an impostor.

EACH EMPLOYEE SHOULD FEEL HIS RESPONSIBILITY

What a wonderful thing it is to have consumers say: "It is a pleasure to do business with your company!" What a satisfaction there is in the knowledge that every one is pleased not only with the mechanical service that is given him but also with the personal service that comes to the consumer through his direct contact with the employees of the company! The important question is, how can this be brought about most rapidly? One does not have to look far for the answer. It is by impressing every individual employee with his responsibility to the public and by careful, painstaking selection by executives of those to whom this important duty is to be intrusted.

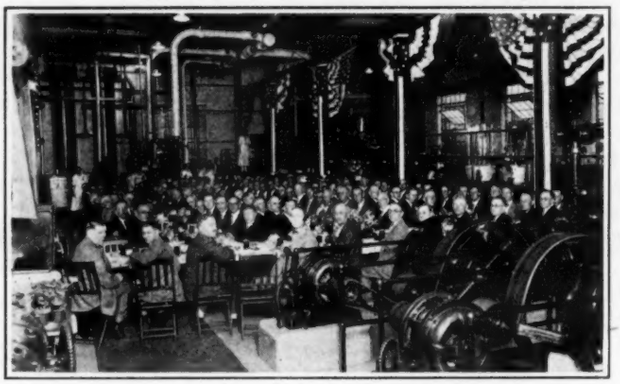
Cashiers and collectors have a great opportunity in this direction. They are in a position to make or mar the good public relations for which all companies are striving. They form a means of contact with the consumer that is personal and delicate, and wherever these employees take pains to recognize their responsibility to those with whom they come in contact and give to them the courteous, kind and sincere service to which they are entitled one will usually find that their company is advancing in the confidence of the people it serves and building up a friendship that time only tends to make stronger.

Utilities and the Ice Business

Various Methods of Development of This Industry by Utilities—Advantages of Combining the Two Businesses—Experience in Operation of Electric Generating and Ice Plants

By A. J. AUTHENREITH
Vice-President Middle West Utilities Company, Chicago.

THE potential annual consumption of 3,072,000,000 kw.-hr. and annual revenue of $46,080,000 from the manufactured ice business is so great that it justifies considerable pioneering work and substantial assistance by utilities in developing the business and converting existing plants to electric drive. A more detailed statement of load possibilities and economies to be effected by electrification of the manufactured ice business will be found on page 797 of the October 17 issue of the ELECTRICAL WORLD. The demand for manufactured ice will continue at an increasing rate and it is largely up to the utilities to decide whether this great load shall be supplied from central stations. Oil-engine manufacturers have recognized the possibilities of the situation and in many cases have made very liberal financing arrangements with the ice companies in the purchase of oil-engine equipment. In spite of this, the number of oil-engine-driven plants is extremely small. It may be said that the oil engine has made practically no impression on the manufactured ice field. The chief reason for this is that electric power when properly installed and supplied from an adequate transmission line system has no competitor in any private plant. The fact remains, however, that while many owners of existing plants would be glad to change from steam to electric drive, they are not in position to do so for financial reasons. In meeting this situation, there are several avenues open to the public utility.



THE OPENING OF AN ICE PLANT WAS MADE A MATTER OF PUBLIC INTEREST AT CANTON, ILL.

COMPREHENSIVE STUDY BY UTILITIES DESIRABLE

Every utility having in its territory a number of ice plants not on its lines should make a thorough, intensive and comprehensive survey of the ice business in this territory. This survey should take into consideration the following conditions in every community: (1) Population; (2) the per capita consumption for this particular community, what it is and what it might be if properly served; (3) water supply, quantity, quality and temperature; (4) railroad facilities for shipping in or shipping out ice; (5) rural demand; this is an important item, especially in dairy districts.

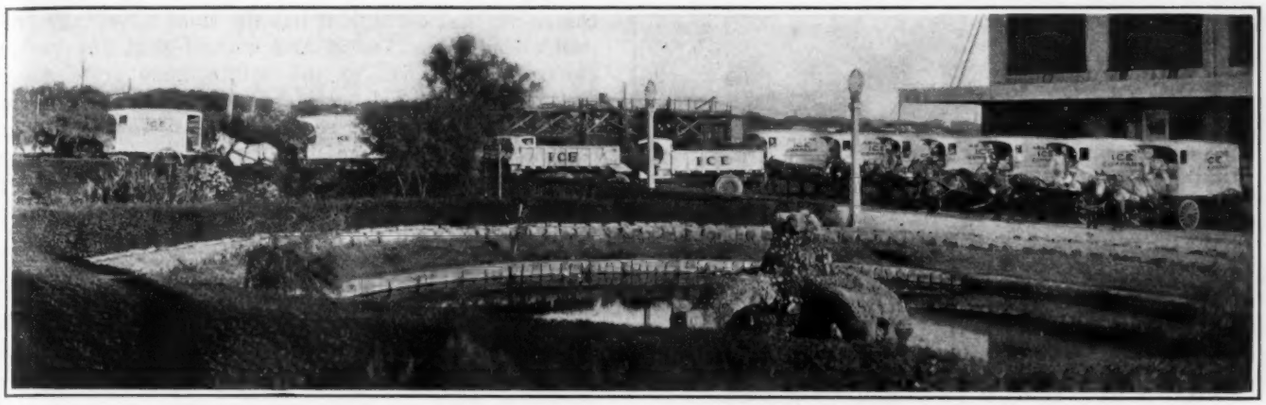
These surveys may indicate that there are more manufacturing plants in a given district than are justified by the consumption that may be reasonably expected. In other localities the ice business may be suffering from the limitations of inadequate rail shipments and inefficient distributing facilities. Companies may have attempted to operate ice plants in places where the water is absolutely unfit for ice manufacture.

If the conditions are such as not to justify a local plant, satisfactory shipping and storage facilities must be had for maintaining an adequate supply of ice at all times. In some cases difficulties of the ice situation are the inefficient operating conditions existing at the plant, due to improper construction or improper equipment for the duty expected. In some localities the chief obstacle to success of the local company is failure to recognize sound merchandising principles in the sale and distribution of ice. The use of ice in the home is so closely associated with the use of food that sanitary conditions in both the manufacture and the distribution of ice are of first importance. There must be consideration for the convenience of the customer, fairness in treatment and accurate records of ice leaving the plant and of money paid by the customer. It is often possible, by proper attention to the requirements of the customers, to stimulate the consumption of ice in the colder months. It is possible to encourage the use of ice boxes and to assist the customer in getting the most for his money, thereby encouraging him to use the ice.

Frequently an ice company is in an unsatisfactory condition because it has not laid aside proper reserves for depreciation, obsolescence or necessary expansion and finds itself face to face with demands for more and better ice but with no funds with which to remodel its plant and meet this demand. This situation means that new capital must be raised or the company should go out of the manufacturing end of the business and purchase its ice from some modern plant in another locality.

TABLE I—MONTHLY VARIATION IN ICE SALES
Middle West Utilities Company. Ice Sold by Months, Year 1924

	Per Cent of Annual Sales		Per Cent of Annual Sales		Per Cent of Annual Sales
January.....	1.6	May.....	8.2	September...	10.7
February....	1.9	June.....	16.4	October.....	6.9
March.....	2.5	July.....	18.5	November...	4.0
April.....	5.0	August.....	22.1	December...	2.2
				Total.....	100.0



DELIVERY EQUIPMENT PAINTED WHITE GIVES IMPRESSION OF CLEANLINESS AND ENCOURAGES CONSTANT ATTENTION TO KEEP IN SANITARY CONDITION. DELIVERY EQUIPMENT OF A MIDDLE WEST UTILITIES COMPANY SUBSIDIARY

After a comprehensive survey of the ice-manufacturing plants in its territory, it is possible for the utility to arrive at an intelligent decision as to what it can do to stimulate the ice business and thereby increase its own revenue. There are several courses open. First, make sure that the particular ice companies understand their actual condition so that they may intelligently apply themselves toward improvement. Full consideration of the results of the company's survey may lead the owners of the ice plants to take up the immediate conversion of their plants to electric drive, getting the new capital where they can. Manufacturers of equipment quite often are able to extend better terms if they know that the purchaser has made an intelligent study of his conditions and knows exactly what to expect from the new capital invested.

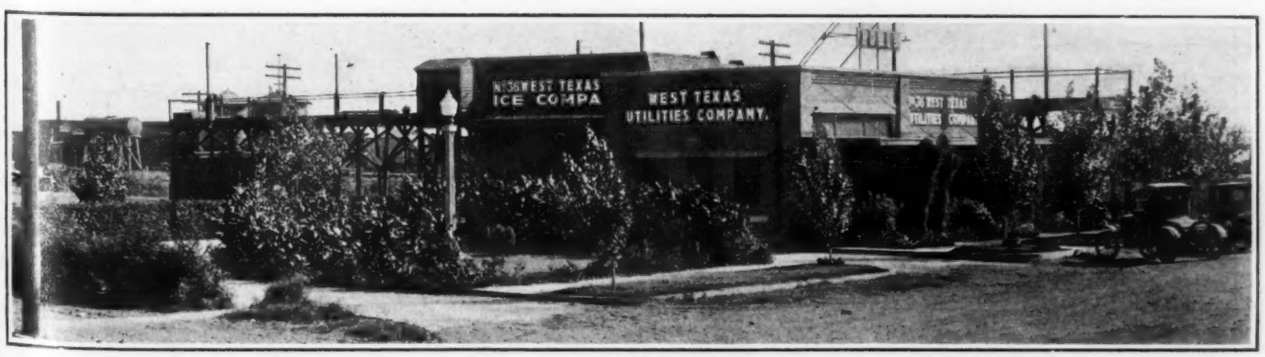
Certain owners of local plants will find it to their advantage to sell their plant and business to a larger organization having greater capital resources and better equipped to carry on the expansion program called for.

Finally, if the local ice company is unable to finance the necessary changes or to sell its property to a larger or stronger company and if the community is in danger of suffering from an inadequate supply of ice at a fair price, the public utility is justified in undertaking the financial and physical reorganization of the plant and engaging actively in the manufacture and sale of ice in this particular community. Such a course must always be justified from the standpoint of public policy as well as financial policy.

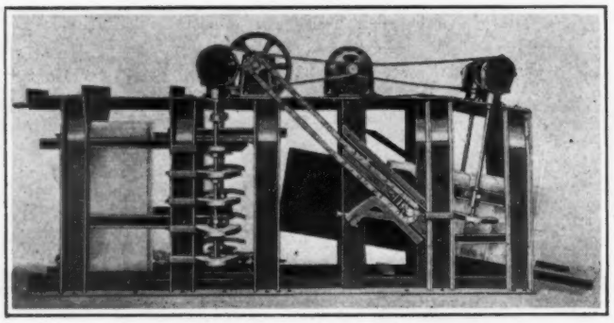
When a utility engages in the manufacture and sale of ice, there are certain further conditions to be understood, the first of which is the amount of capital required and the rate of turnover to be expected. The average fifty-ton ice plant, suitable for a community of approximately 10,000 population, will cost in the neighborhood of $125,000. The gross earnings from such a plant will vary from $50,000 to $70,000 and will perhaps average $60,000. This means that when a company engages in the ice business it must invest from $2 to $2.50 of fixed capital for every dollar of gross revenue expected. It will be seen that while the capital turnover in the ice business is less than that found in the average mercantile business, it is greater than in the utility business. For this reason it is often possible for utilities to invest money profitably in a well-designed and carefully managed ice business.

The Middle West Utilities Company subsidiaries are primarily electric utilities, but when acquiring various electric properties have found several ice plants incorporated in the same organization with electric generating plants and often operating in the same buildings. During the first year of operation the Middle West Utilities Company acquired about twenty ice plants, all steam driven and of either the absorption or compression type. This company, upon finding itself in the ice business, determined to make successful this new child by adoption. Soon after this there began a rapid extension of transmission lines throughout the company's territory, resulting in the shutting down of many steam plants. This new situation deprived several of the ice plants of their steam power supply and it became necessary to take care of them in some other way. The most economical power supply was found to be the transmission lines of the company and, of course, many of the company's ice plants were immediately electrified.

The success had with those plants that were electrified by force of circumstances was such as to encour-



OFFICES OF THE ELECTRIC UTILITY AND ICING STATION MAY BE COMBINED WITH ECONOMY AND MADE ATTRACTIVE BY MODERN LIGHTING AND LANDSCAPING

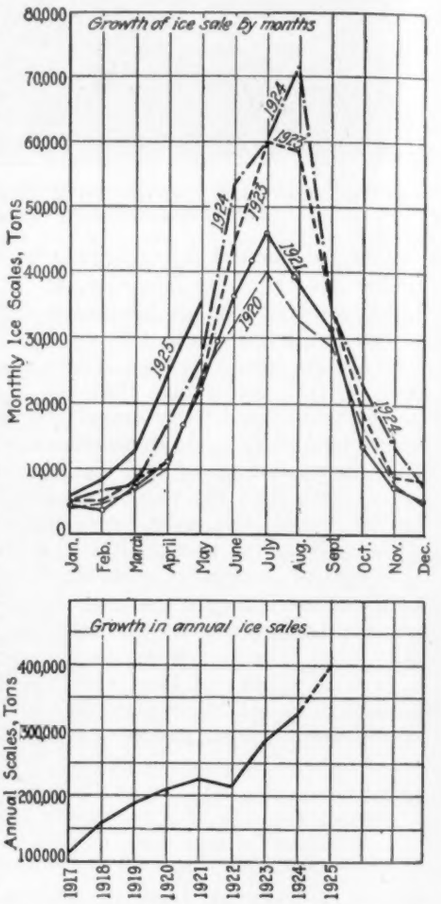


MOTOR-DRIVEN ICE-SCORING MACHINE ELIMINATES SPRING SCALES, POSSIBILITIES OF OVERWEIGHT OR UNDERWEIGHT AND REDUCES LABOR OF DELIVERY MEN. THE WEIGHT OF SCORED ICE CAN BE GUARANTEED WITHIN 2 PER CENT

age the electrification of certain other plants that were still in position to receive steam from existing generating plants. The Middle West Utilities Company subsidiaries now operate more than fifty all-electric ice plants, ranging from ten tons to 200 tons ice-making capacity per day. These electric plants, together with the remaining steam plants, constitute the largest group of ice plants in the country under one management. These plants used 13,203,343 kw.-hr. in 1924, and had all the plants been completely electrified, the energy consumption would have reached 25,000,000 kw.-hr.

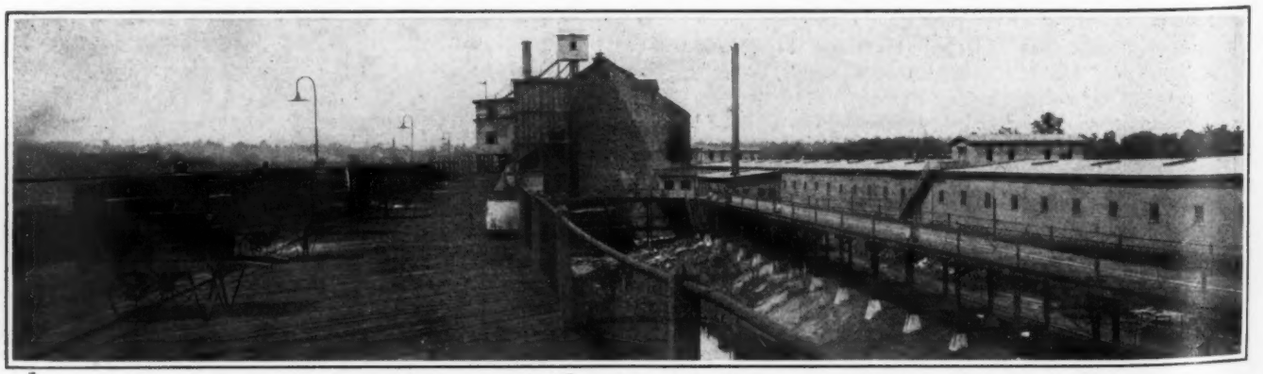
In working out the successful operation of its plants, this company has been careful to give full attention to local and climatic conditions that affect the cost and quality of ice produced. Local conditions to be considered include the quality, quantity and temperature of the water available for the ice cans and for cooling purposes. Climatic conditions are important as affecting the load factor of the plant and the relative amount of storage necessary. Local market conditions have an important bearing on the load factor and storage requirements. Plant designs have been worked out to meet these conditions.

There are many advantages to be gained from the combined operation of a public utility and an ice plant. A most important advantage is the power of the utility to finance the business economically. In the communities in which the Middle West Utilities Company subsidiaries are engaged in the ice business the offices of the ice and utility departments are combined and much the same office personnel is utilized by both businesses. Economy in building property is also realized. Most important, however, the ice business is subject to the same careful and competent supervision that the utility company enjoys, an engineering department having jurisdiction over all ice plants of the company, with the result that each plant has the same advantage from centralized management and control that the various generating stations of the utility have from a centralized operating department. The manufacture and distribution of the ice receive the same attention that the manufacture and distribution of electrical energy receive and the public relations of the company are considered of first importance. The utility is further in position to give adequate publicity to the ice business and to stimulate ice consumption. A study of the ice plants and ice business of today reveals the fact that these plants are largely locally owned and from the standpoint of operating and financial advantages are somewhat in the same position that small utility plants were twelve years ago. It is reasonable to expect that these ice plants and the ice business in general will profit from centralized control, management and operation, just as the small utility plant and the utility business has benefited from centralized financing and operation.



GROWTH OF ICE SALES IN PLANTS OWNED AND OPERATED BY THE MIDDLE WEST UTILITIES COMPANY SUBSIDIARIES

Considering the advantages accruing from the combined operation of a utility and an ice business, the utility should be able to operate an ice business with profit to itself and to the community.



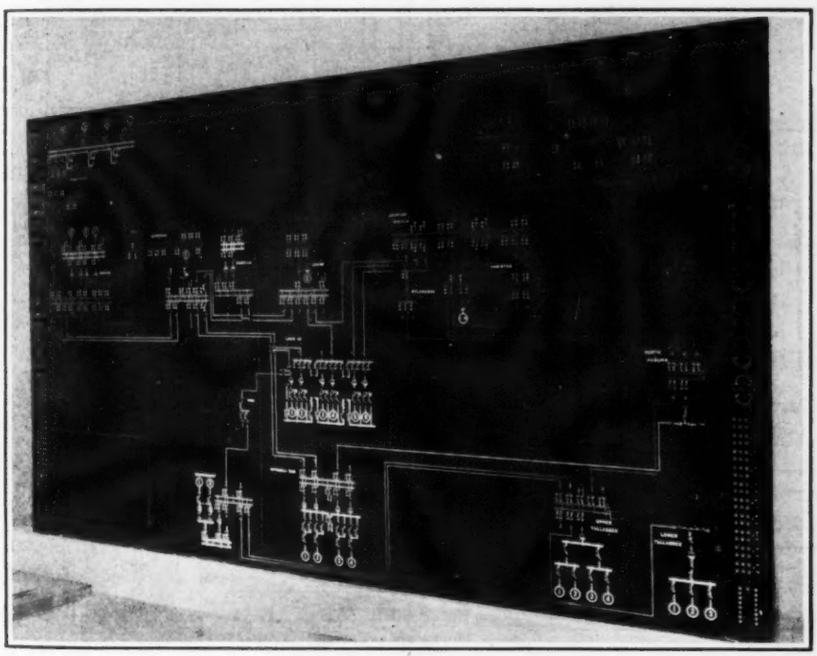
LARGEST CAR ICING STATION ON ILLINOIS CENTRAL RAILROAD, MOUNDS, ILL. MIDDLE WEST UTILITIES SUBSIDIARIES SUPPLY 75,000 TONS ANNUALLY FOR CAR ICING

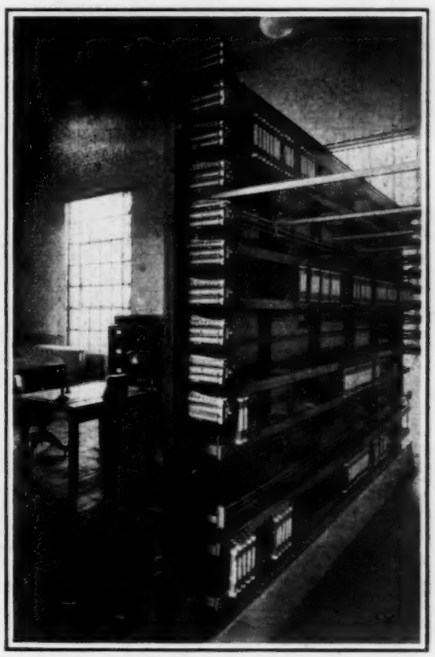
Short-Circuit Calculating Table

New and Interesting Features Incorporated in Board Built by the Alabama Power Company—Arrangement of Apparatus and Details of Use Described

By S. MURRAY JONES*
Carolina Power & Light Company, Raleigh, N. C.

A NEW short-circuit calculating table which, although not fundamentally different from several others that have been built, is considerably larger and contains some new and interesting features, has been designed and built by the Alabama Power Company. This table consists fundamentally of a complete single-phase miniature of the entire primary system, with sufficient additional variable resistors to allow for calculations including future developments. Front and rear views of the board are shown in Figs. 1 and 2.





FIGS. 1 AND 2—FRONT AND REAR VIEWS OF ALABAMA POWER COMPANY'S CALCULATING BOARD

The main reason for departing from the standard calculating tables, which is built of variable resistors only, is to simplify and facilitate the calculation of short circuits. By having all the present lines, generators, transformers and other equipment represented by fixed resistances the labor of preparing the table for a short-circuit study, and making the study, is materially reduced. In another feature also it has already proved its advantage over the old type. In case of an unusual set of system connections due to lines or other equipment being temporarily out of service the load dispatcher can set up the table in a very few minutes, find out the short circuits at various points and determine whether it will be necessary to change any relay settings to take care of abnormal loads or operating conditions. This simple design, therefore, does away with the necessity of having an experienced man always on hand when operating the table.

The main table consists of twenty bakelized paper panels (General Electric Company, No. 114 compound) ½ in. thick, 2 ft. 8 in. long and 2 ft. wide, containing the system in miniature; and in addition twenty variable resistors with the necessary buttons, jacks, switches and resistance tubes. The variable units, which are arranged on each end of the board, are so wired that they may be used as either a generator or a line representation. The main panels are used for the mimic reproduction of the system, all resistance tubes and wiring being located on the back of the board. The compound panels are mounted on a steel supporting framework of tees and angles as shown in Fig. 3. The resistance tubes are all mounted on fiber strips located on the back of the board as shown in Fig. 4, and are so wired that any one tube may be easily removed without destroying the main connections.

LOCATION OF APPARATUS ON BOARD

The general arrangement of the board is such that each piece of apparatus is located on the panels in practically the same position as the actual apparatus at that station. Oil switches on the system are represented by small Leeds & Northrup nickel-plated knife switches. At most of the stations on the board, it will be noted, there are two buses and two oil switches. The usual

*Mr. Jones was formerly connected with the operating department of the Alabama Power Company.

system practice is to have only one oil switch and two sets of disconnects that permit connection to either bus. However, on the calculating table it was necesary to use two knife switches to designate this arrangement so that connections might be made to either bus. At each oil switch are shown one ammeter button and a jack. The ammeter button is a Western Electric No. 92-A key and the jack is a Western Electric No. 159 telephone jack. The schematic arrangement of resistance tubes, ammeter buttons, jacks and knife switches is shown in Fig. 5.

The wiring of the table is made with No. 16 and No. 20 braided black enamel wire, and all soldered connections are made with rosin core solder. Ordinary solder and soldering paste cannot be used, because the paste has a tendency to run freely and in so doing the chemicals it contains may short circuit several of the contacts of the ammeter buttons.

Direct current is used on the table, the positive lead being connected to one side of all the generator resistance tubes, and the negative lead being brought to two jacks, one on each side of the table. A flexible lead from one

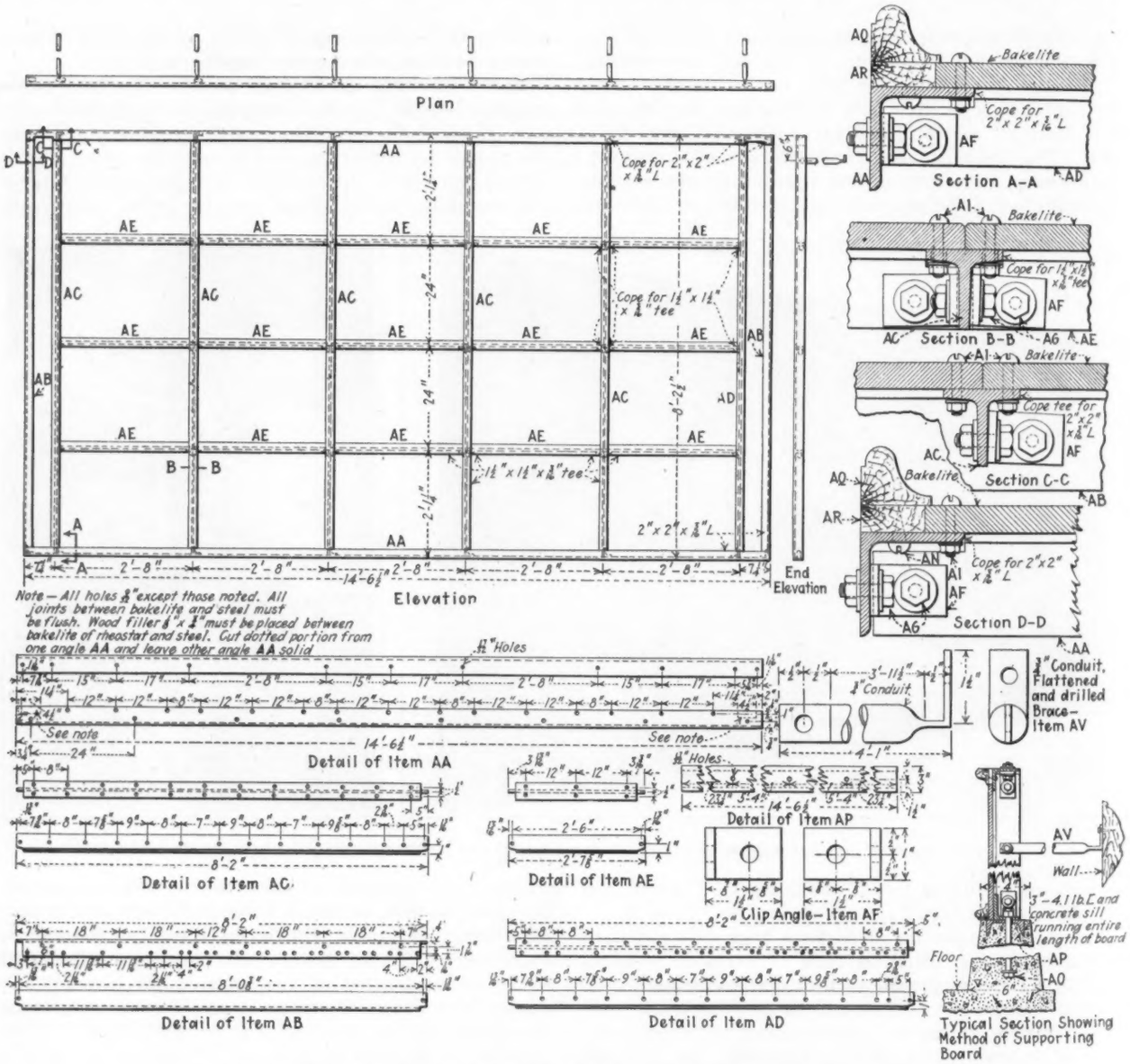

Plan
Elevation
End Elevation
Section A-A
Section B-B
Section C-C
Section D-D
Bakelite
Cope for 2"x2"x¼"L
Cope for 1½"x1½"x¼"tee
Cope tee for 2"x2"x¼"L
Cope for 2"x2"x¼"L
Note—All holes ⅝"except those noted. All joints between bakelite and steel must be flush. Wood filler ⅛"x 1"must be placed between bakelite of rheostat and steel. Cut dotted portion from one angle AA and leave other angle AA solid
Detail of Item AA
Detail of Item AB
Detail of Item AC
Detail of Item AD
Detail of Item AE
Detail of Item AP
Clip Angle—Item AF
¾"Conduit, Flattened and drilled Brace—Item AV
3"—4.1 lb. L and concrete sill running entire length of board
Floor
Wall
Typical Section Showing Method of Supporting Board

FIG. 3—STEEL ASSEMBLY AND DETAILS FOR SHORT-CIRCUIT CALCULATING BOARD

BILL OF MATERIAL FOR SECTION OF BOARD SHOWN IN FIG. 3

Item	Number Required	Description	Item	Number Required	Description
AA	2	2-in. x 2-in. x ⅛-in. x 14-ft. 6½-in. steel angles	AL	200	⅜-in. standard iron washers
AB	2	2 -in. x 2 -in. x ⅛-in. x 8-ft. 2-in. steel angles	AM	350	⅜-in. standard brass washers
AC	4	1½-in. x 1½-in. x ⅛-in. x 8-ft. 2-in. steel tees	AN	36	1-in. No. 14 round head iron wood screws
AD	2	1½-in. x 1½-in. x ⅛-in. x 8-ft. 2-in. steel tees	AO	3	¼-in. iron machine bolt with nut and washer
AE	15	1½-in. x 1½-in. x ⅛-in. x 2-ft. 7½-in. steel tees	AP	1	3 -in. x 14-ft. 6½-in. 4.1 lb. steel channel
AF	46	1½-in. x 1½-in. x ⅛-in. x 1-in. clip angles	AQ	48 ft.	L.L.Y.P. 1¼-in. x 1¼-in. brick molding
AG	80	¼-in. x ¾-in. hexagonal iron machine bolts	AR	48 ft.	L.L.Y.P. ¼-in. x 1½-in. filler
AH	12	¼-in. x 1 -in. hexagonal iron machine bolts	AS	30 ft.	L.L.Y.P. ¼-in. x ¾-in. filler
AI	350	⅜-in. x 1 -in. round head brass machine screws	AT	¼ lb.	¼-in. wire brads, iron
AJ	100	¼-in. hexagonal iron nuts	AV	6	¾-in. x 4-ft. 3-in. iron conduit
AK	350	⅜-in. hexagonal brass nuts			

of these negative points to any of the jacks on the board places the short circuit wherever desired. Jacks and ammeter buttons are placed at all switching points on the system. The function of the ammeter buttons is to give the reading of short-circuit current in the various lines or other equipment on the system that are contributing to the total short circuit. The buttons are all so wired that one position of the polarity switch, on the operating table, indicates current flowing from right to left through lines or other equipment, or from top to bottom, as the lines are shown on the board; the reversal of the polarity switch of course indicates current flowing in the opposite direction. In this manner the direction of current flow in any line, as well as the magnitude, is definitely known.

The main control for the board is on a desk located approximately 6 ft. in front of the shirt-circuit board. This desk is shown in Fig. 6 and contains the main line switch, voltage-regulating equipment, meter, voltage switch, current switch, meter shunt and short-circuit totalizing button. The meter is a milliameter calibrated to give a reading of voltage with one set of connections and having the other scales for current readings. The current scales instead of being marked in amperes are calibrated in terms of the short-circuit kilovolt-amperes that would occur on the actual system, 1 amp. through the meter representing 3,000,000 kva.

Method Used in Calculating Resistance of Tubes Representing System Equipment

The table base, as indicated, is 3,000,000 kva. at 100 volts direct current. An explanation of the method of calculating the resistance of tubes representing the different equipment on the system may not be out of place at this point. In calculating the resistance of tubes for the generators, condensers and transformers on the system the manufacturers' single-phase short-circuit reactance is used; for example, the reactance of the 20,000-kva. generators at Mitchell Dam is given as 35 per cent on their own base. Transferring this to

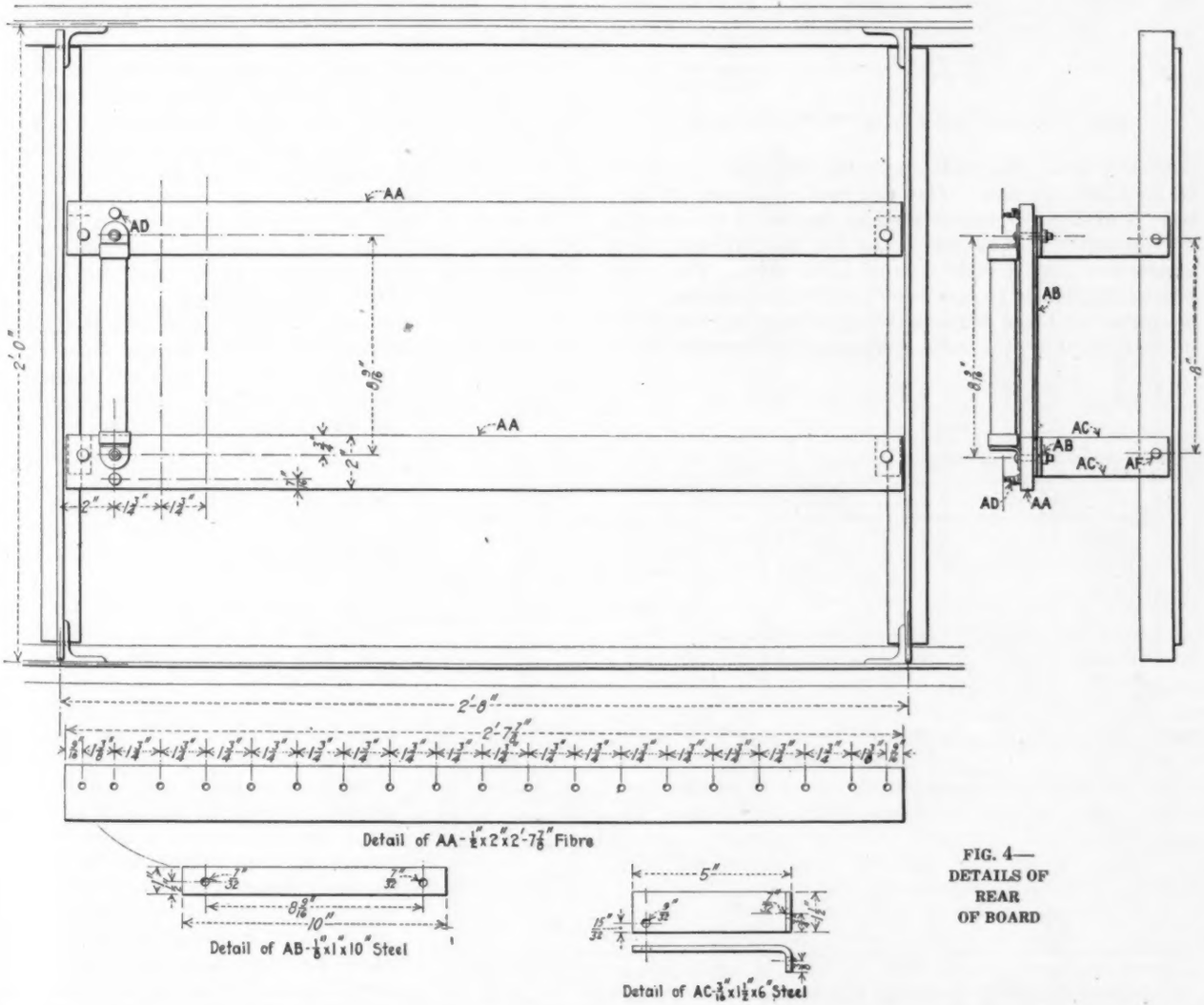


FIG. 4—DETAILS OF REAR OF BOARD

BILL OF MATERIAL FOR SECTION OF BOARD SHOWN IN FIG. 4.

Item	Number Required	Description	Item	Number Required	Description
AA	40	½-in. x 2-in. x 2-ft. 7⅞-in. red fiber strip	AE	80	⅜-in. steel lock washers
AB	40	⅛-in. x 1 -in. x 10-in. steel	AF	80	⅜-in. x 1¼-in. round head steel bolts
AC	40 left, 40 right	⅜-in. x 1½-in. x 6-in. steel	AG	300	¼-in. x 1-in. round head steel bolts
AD	300	Brass binding posts	AH	380	¼-in. hexagonal head steel nuts

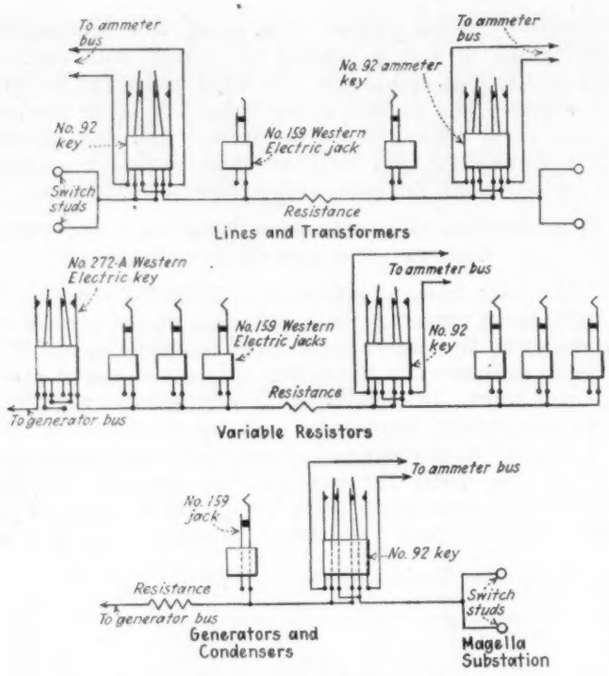


FIG. 5—ARRANGEMENT OF APPARATUS ON BOARD

3,000,000 kva., the table base, the reactance is found to be 5,250 per cent. One per cent reactance on this base is arbitrarily represented on the board by one ohm of resistance. Thus the tubes for the Mitchell Dam generators have a resistance of 5,250 ohms. The same procedure applies to condensers and transformers. The reactance of three winding transformers is reduced to an equivalent *Y* and three resistance tubes connected in *Y* are used to represent them. In calculating the resistance of tubes for the transmission lines a similar procedure is used; the ohms single-phase reactance of the line is calculated, knowing its characteristics such as size conductor, spacing and length, and the reactance in ohms transferred to per cent reactance on a base of 3,000,000 kva. A tube having a resistance equal to the per cent calculated reactance on this base is used to represent these lines. The smallest resistance tube on the board is 137 ohms, and the largest 42,000 ohms. Resistance tubes were obtained with a guaranteed accuracy of plus or minus 3 per cent and on checking up the measured resistance of all the tubes, including the wiring, against the calculated values, the average error was found to be 1.3 per cent above calculated values.

Designation of Lines Made with a Special Paint Mixture

Considerable time was spent in deciding on the method of designating lines and equipment on the front of the board. It was first believed the celluloid strips and symbols glued to the board would be best, as they would be easily removable. However, after trying practically every type of glue and cement manufactured it was decided that the celluloid was too easily removed, and finally all lines and other representations were painted on with a Japan paint mixed with turpentine. It was found that turpentine did not affect the Bakelite finish, and the paint could be fairly easily removed with turpentine in case of necessary changes in lines or equipment. White is used to represent all low-tension voltages such as generator voltages, green the 44,000-volt and red all 110,000-volt equipment.

Due to the many contacts on buttons and jacks, and the numerous soldered connections, trouble from short circuits, both high and low resistance and contact trouble will undoubtedly be encountered from time to time, and with this in view each of the twenty panels is wired as a unit. Hence in case of trouble one panel can be isolated at a time and the trouble easily run down by ringing out with a test set.

Two men are required for the operation of this type of table. However, this is not a disadvantage, as the studies can be made in less than half the time that would be necessary with the old type. It is not expected that the calculating table, consisting of variable resistors only, will be completely replaced by this new arrangement, because, where studies of different systems have to be made, variable units are obviously necessary to take care of the different set-ups. It is believed, however, that where a system is definitely laid out a mimic reproduction such as this one not only will be less expensive than a board composed of variable units, with a sufficient number to take care of all lines and other equipment, but will materially simplify short-circuit studies and prove itself more valuable in every respect.

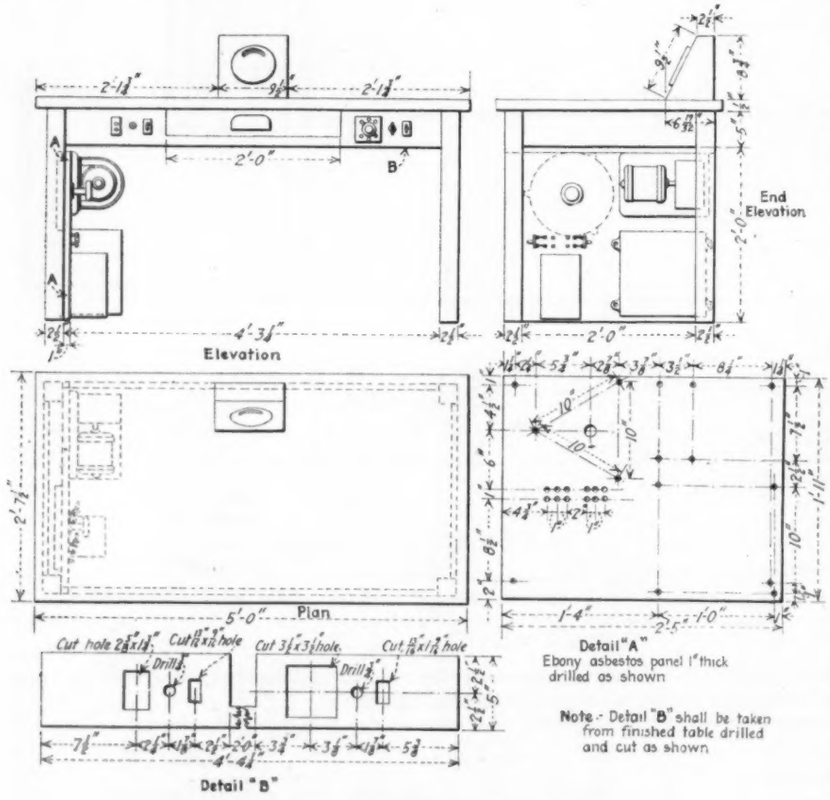

Elevation
End Elevation
Plan
Detail "A"
Ebony asbestos panel 1" thick drilled as shown
Note:- Detail "B" shall be taken from finished table drilled and cut as shown
Detail "B"

FIG. 6—MAIN CONTROL DESK FOR BOARD

400,000,000 Outlets Are in Prospect

A Survey of Residence Wiring Shows Fifteen More Outlets Needed in Each Home Served—Residential Wiring Job Only Started —What Each House Should Have Is Now Known

By M. LUCKIESH
Director Lighting Research Laboratory, Nela Park

MUCH can be done in improving lighting and in increasing central-station revenue by equipping present fixtures with better lamps and shades or by replacing many of these fixtures. However, adequate and convenient lighting will still be far from full realization until the number of fixture outlets and convenience outlets is greatly increased. Convenience outlets are necessary if the use of portable lamps is not to be inhibited and, of course, they also encourage the use of appliances. As stated in the article published in the October 10 issue of the ELECTRICAL WORLD we not only need to know the present conditions of wiring and lighting in the home but must set up reasonable standards that shall be our goal. The former has been accomplished by two extensive surveys and the latter by intimate study of lighting possibilities and requirements. The standard we have set up we have termed the "conservative ideal" and its wiring and lighting equipment have been designed to provide adequate and convenient utilitarian wiring and lighting from a utilitarian viewpoint.[1]

THE REASONABLE POSSIBILITIES OUTLINED

In this conservative ideal at least one convenience outlet is provided for each room, and at least one ceiling outlet for all rooms with the exception of the bathroom. Utilitarian wall brackets are provided as follows: One in kitchen, two in bathroom at the mirror, and two in each bedroom between which a mirror is located. The average home consists of six and one-half rooms, there being approximately two and one-half bedrooms. This is exclusive of attic, closets, hallways, etc. Obviously it is possible to provide satisfactory wiring and lighting in the average home by means of a number of different layouts. In arriving at the specifications for the conservative ideal, various layouts were made and finally one was chosen that was considered to be the most generally practicable. This need not be followed exactly, but something at least equivalent seems to be desirable. The following are condensed specifications exclusive of wall switches:

Basement—1 convenience outlet; 5 ceiling outlets.
Kitchen—1 convenience outlet; 1 ceiling fixture, 1 wall bracket.
Dining Room—1 convenience outlet; 1 ceiling fixture; (portables for buffet).
Living Room—3 convenience outlets; 1 ceiling fixture; (various portables).
Hall—1 convenience outlet; 1 ceiling fixture.
Bathroom—1 convenience outlet; 2 wall brackets.
Bedrooms (average 2½ per home)—2½ convenience outlets; 2½ ceiling fixtures; 5 wall brackets; (2½ portables).
Total (exclusive of attic, closets, and exterior)—10½ convenience outlets; 11½ ceiling fixtures; 8 wall brackets; (8½ portables).

[1] M. Luckiesh, *Proc.* N. E. L. A., Vol 79, 1923, p. 598; Report of Lighting Committee, Residence Lighting, N. E. L. A., 1925.

In the foregoing, the portable lamps have been indicated so as to give a better idea of the complete lighting equipment. Again it is emphasized that these items must be considered not only for a given room but for a home as a whole and that they represent what is considered a generally practicable compromise of several possible layouts.

The survey conducted three years ago revealed an average of 2.5 convenience outlets per home as compared with 3.4 convenience outlets at present. This is

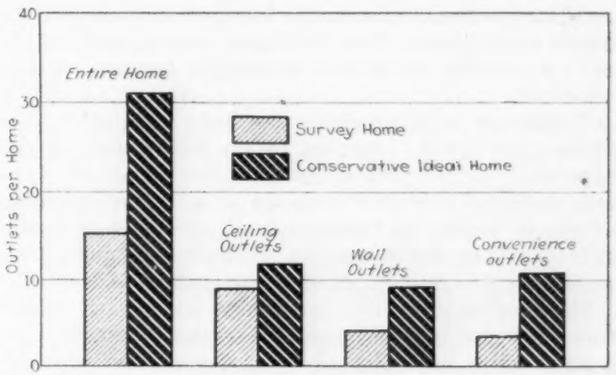


FIG. 1—CAN OBTAIN EIGHT CONVENIENCE OUTLETS PER HOME

The average total number of outlets (exclusive of wall switches and inclusive of convenience outlets, wall brackets and ceiling fixtures) in wired homes at the present time compared with the recommendations for the "conservative ideal." Outlets in closets, attic, outdoors and garage are not included. The wall outlets for the conservative ideal include only those for the eight utilitarian brackets, but the average figure for the present wired homes includes all wall brackets, only 2.5 per home being utilitarian instead of eight as recommended.

about the only conspicuous advance in wiring as revealed by the recent survey. The summary presented in Table I shows at a glance the present wiring in terms of the standard which we have termed the conservative ideal. These figures do not include attic, closets, exterior or garage.

In connection with refixturing campaigns it should be noted that about one-third of the total ceiling fixtures existing in wired homes at the present time are unquestionably obsolete and many others are unsatisfactory. There are about 3.9 wall brackets in the average home, but only 2.5 of them are utilitarian in the sense used here; that is, a total of only 2.5

TABLE I—OUTLETS IN PRESENT WIRED HOMES COMPARED WITH THOSE SPECIFIED FOR THE CONSERVATIVE IDEAL

	Present Wired Homes	Conservative Ideal	Per cent Saturation
Convenience outlets	3.4	10.5	31
Ceiling outlets	8.6	11.5	75
Utilitarian wall brackets.	2.5	8	31
Total outlets exclusive of wall switches	15.6	30	52

wall brackets are found in kitchen, bathroom and bedrooms of the average home.

The total number of convenience outlets, ceiling outlets, wall outlets in wired homes at the present time is compared in Fig. 1 with the recommendations for the conservative ideal. In the case of wall outlets those which are not located in the kitchen, bathroom and bedrooms are included, making a total of 3.9. However, these are compared with the eight wall outlets specified primarily for utilitarian purposes in the conservative ideal.

Of course, there are many opportunities for the use of wall brackets primarily for decorative purposes. In fact, these could easily exceed in number the eight utilitarian wall brackets. However, decorative lighting has purposely been omitted from consideration, because it seems best to sell adequate wiring for utilitarian lighting before the less tangible aspects are touched upon. This does not mean that wiring for decorative lighting should be discouraged or omitted from the specifications.

The distribution of convenience outlets in various rooms of the average wired home is shown in Fig. 2, and this is compared with the recommendations for the conservative ideal. Until the latter goal is realized the use of portable lamps and appliances is more or less inhibited.

Utilitarian wall brackets are badly needed in the kitchen and at the mirrors in the bathroom and the bedrooms. Of course, in the bedrooms a pair of properly designed portables could be used at the principal mirror or a pair of brackets could be fastened to the mirror. This would require at least one more convenience outlet instead of the wall outlets.

The tendency should eventually be toward wired furniture and more convenience outlets, because this permits more flexibility in arrangement of furniture. However, until the manufacturer of furniture equips mirrors with brackets or until the fixture manufacturers and dealers provide good brackets which can be installed in this manner, it seems best to specify the wall brackets. If bedrooms are carefully studied, it is found that there is usually only one satisfactory arrangement of furniture and that the best place for the principal mirror is generally obvious.

The number of utilitarian wall brackets in the kitchen, bathroom and two and one-half (average) bedrooms, and the total of these, are shown in Fig. 3, compared with the recommendations for the conservative ideal.

A GLIMPSE OF WIRING BUSINESS

There are nearly twelve million homes already wired in this country, but the number of outlets is only half what it should be for adequate and convenient utilitarian wiring. In other words, an average of fifteen more outlets should exist in each wired home, or a total of 180,000,000 outlets should be installed in present wired homes. There are nearly one million homes being built each year. Computing the various possibilities we obtain results as follows:

Adding fifteen more outlets in each of the twelve million wired homes totals 180,000,000 outlets. Providing thirty outlets for about one million homes built each year totals 30,000,000 outlets. Providing thirty outlets for six million unwired homes which are at present within easy reach of the electric service totals 180,000,000 outlets. Besides these there are

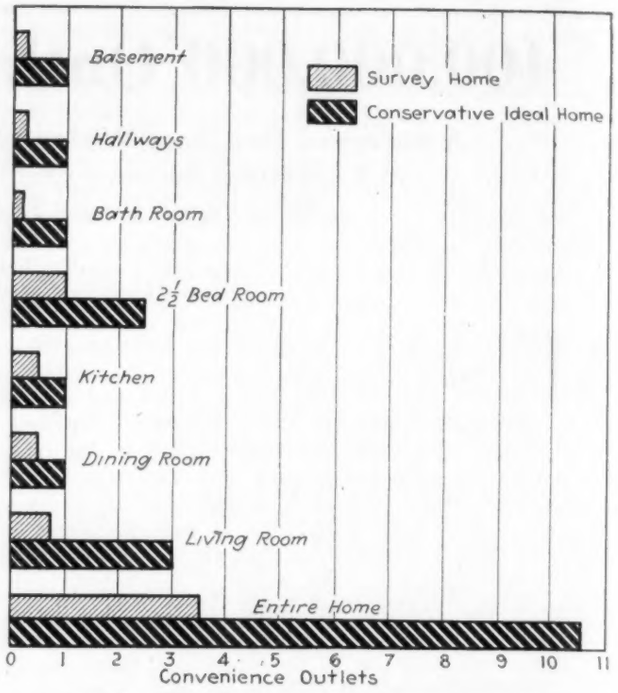


FIG. 2—DISTRIBUTION OF CONVENIENCE OUTLETS

Average number of convenience outlets existing in various rooms and in the entire home at the present time. These are compared with the recommendations for the "conservative ideal" home.

about nine million unwired homes, many of which may be served with electricity through private generating plants, party lines, etc. These represent potential wiring business. By multiplying these figures by the dollars per outlet, attractive figures in terms of dollars are obtained.

This wiring job must be done before the central station and other electrical interests can obtain their full share of the revenue from the residential field.

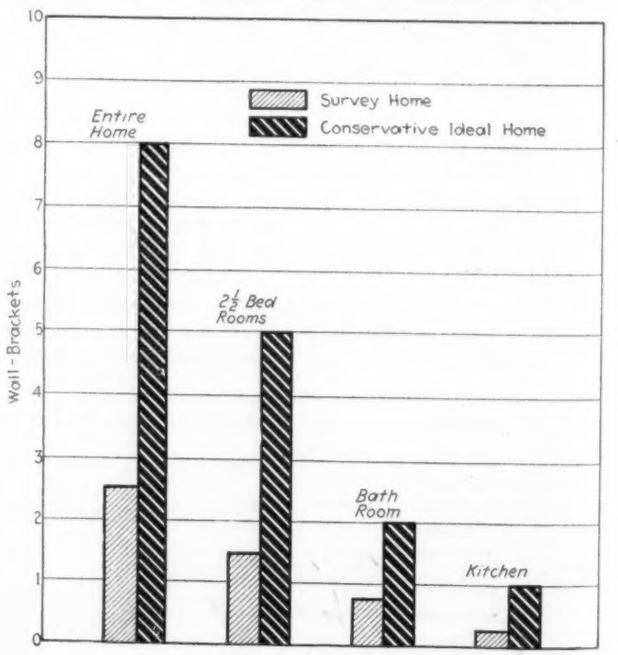


FIG. 3—WALL BRACKET POSSIBILITIES

Average number of utilitarian wall brackets existing in certain rooms and the total number of these at the present time. These are compared with the recommendations for the "conservative ideal" home.

Letters from Our Readers

Operating a Fully Interconnected System

To the Editor of the ELECTRICAL WORLD:

Your article on "Operating a Fully Interconnected System," starting in the September 26 issue of the ELECTRICAL WORLD, is very timely, and I am sure it will be welcomed with more interest than any article that has appeared in the ELECTRICAL WORLD for a long time. You have hit on a very live subject, one that is loaded both with dynamite and with great possibilities.

Your article is so comprehensive and complete that such comments as I make are of minor importance. However, the question arises in my mind whether the Consumers Power Company or other companies would follow the practice adopted in Georgia of "pulling a hole" in the reservoirs in anticipation of a rain and consequent loss of water. With the proper records and consistent data which have been accumulated by the load dispatcher over a period of years, it is possible to gamble with storage water to some extent. By starting to "pull a hole" in the reservoir at the same time the rain starts it is possible to save some water.

In checking up the time it takes the Consumers Power Company to get steam turbines on the line I find that on the Pennsylvania-Ohio Power & Light system, with boilers banked, it is at present possible to put 15,000-kva. turbines on in fifteen minutes and a 35,000-kva. turbine on in forty-five minutes.

On our system we have a plug board with red or black pegs stuck in holes opposite each generating unit, rotary converter, frequency changer and transformer-bank symbol. A black plug in the hold adjacent to a piece of apparatus signifies that the apparatus is either in service or ready for service. A red plug indicates that the equipment is out of service for some reason and not available for use.

In the Ohio superpower district a reciprocity scheme has been inaugurated with the surrounding power companies which provides that the load dispatcher of each separate power company shall notify the neighboring power company immediately should he discover a storm approaching and showing any possibility of moving in the direction of the neighboring company. This has been a very valuable factor in our load dispatching.

INTERCONNECTION AND OPERATING

In making a preliminary study of a proposed interconnection, special regard should be paid to the present and future capacity of the several systems, and a curve should be projected as accurately as possible for five to ten years in advance. After making a careful analysis of the attending conditions, depending on whether the interconnection is for the purpose of interchange of power or for a direct sale or direct purchase of power, it is necessary to study a proper handling of the "froth" (reactive volt-ampere-hours and reactive volt-ampere maximum) along with the kilowatt demand, firm demand, primary power and secondary power demands. Since the problem of handling the "froth" is a phase of interconnection which seems to be the cause of most controversies among the load-dispatching personnels of the different systems, certain fixed maximums should be determined and proper relaying provided to limit such amounts.

If a study of this kind were to contain too many general statements and suppositions, it would be valueless; therefore a specific set-up of conditions pertaining to any given time and load should be determined and the interconnection based on these conditions. This information could be easily changed from time to time.

Some power companies adopt the policy of separating from one another during electrical storms. Others do not do this.

A seasonal-load curve and daily-load curves of each power company superimposed upon each other would indicate what effect interconnection will have in smoothing out the peaks. Likewise, system-interruption curves of each power company superimposed on each other would indicate additional benefits from mutual operation.

Formation of a transmission loop of which different power companies constitute portions has important advantages, but there are also several serious handicaps. Where possible, the loop should be left open at some logical point to avoid the difficulties of adjusting line regulation, "froth" and loads between the different power companies, and to eliminate the necessity in some instances of installing a bank of transformers to correct phase-angle relations between "Y" and delta connections.

The scheme of transmitting energy from one company to another through the properties of a third company, acting as a carrier only, should be avoided. While there are a few such instances in the country, they are unsatisfactory for obvious reasons. In contractual agreements load-dispatching authority should be arranged for at a central point both geographically and with relation to communication facilities, the latter being particularly important.

Since numerous power companies are installing carrier-current communication apparatus, care should be taken in selecting the equipment to provide for future requirements. The equipment should be of extra high power and of the most reliable type obtainable. Repeating stations and selective wave-changing apparatus should be provided, or provision be made for its future addition, in order to facilitate intercommunication between several power companies operating on different wave bands.

The relaying problem should be carefully solved and the features of its solution incorporated in the preliminary agreement, in order to prevent further controversies. Interconnections are made operable only when the relaying equipment at the interconnection point has a definite relation to the relaying scheme of the systems before they were interconnected. Voltage regulation and adjustment of "froth" between the power companies forming the interconnection should have specified limits and means of adjustment, either by paying for any excesses or by giving the system load dispatcher authority to control the synchronous condensers on the interconnected systems.

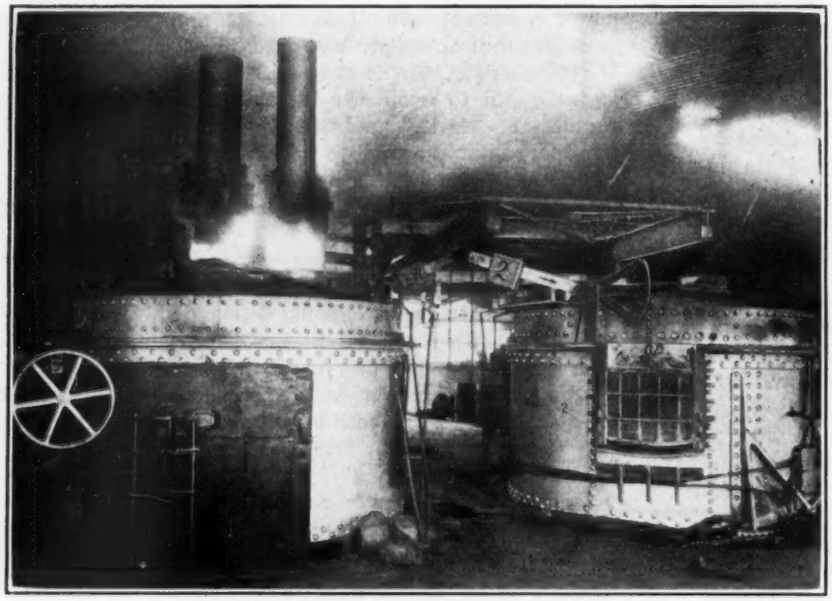
Responsibility for patrolling and maintenance of interconnected equipment and lines that are pertinent to the interconnection should be divided between the interconnected companies. In the past this feature has been usually left to some general agreement between the operating departments after the interconnection is made —a method sometimes resulting in misunderstanding and inadequate service.

G. A. ILER,
Electrical Engineer.
Pennsylvania-Ohio Power & Light Company,
Pennsylvania-Ohio Electric Company,
Youngstown, Ohio.

Central Station and Industrial Practice

Duplex Furnace Operation in Steel Company

TWO 3-ton furnaces are mounted on a turntable at the Burnside Steel Company's plant, Chicago, so that one set of electrodes and control, busbars, transformers and meters can be used and the power demand of both merged into a virtually continuous load without losing the service of either furnace. One furnace melts its charge while the other is being tapped, patched and recharged. When the charge is completely melted in one furnace and ready for tapping, the three electrodes are raised, the table is turned one-half revolution, the electrodes are lowered into the recharged furnace and the melted charge is tapped. With this cycle of operation, power is on practically all of the time, no time is lost between tappings and only a small amount of heat is lost from electrodes because they are not allowed to cool down.



DUPLEX ELECTRIC FURNACE IN OPERATION

A small crane is used to lift the roof off the furnace to be loaded, the traveling crane being used to load the charge. A preheat arrangement is included in this installation by which the charge will be preheated with oil before being melted down electrically. The additional economy of oil preheating is not attended by any effect on the high quality of steel turned out by the electric furnace.

The power demand of these 3-ton furnaces is about 1,650 kw. and they jointly turn out approximately 20 tons in a ten-hour day.

This installation is one of the recent ones in Chicago to take care of the demand for electric steel. Four jobbing steel foundries in Chicago use electric furnaces to melt steel. Two other installations are not in the regular jobbing foundry business.

Energy is furnished these furnaces by the Commonwealth Edison Company.

Handling Transil Oil

BY D. R. DALZELL
Transformer Field Engineering Department, General Electric Company

IMPROPER handling of transil oil while in storage has often been found to lower the quality of the oil. It has sometimes been found that oil drums, because they leaked, have been stored with the bungs turned up. The condition of bungs should be checked immediately upon receipt of the drums. They should be tightened if necessary and the drums stored on their sides with the bung at an angle of 45 deg. below the horizontal. In this position water cannot collect on the bung, nor can the bung take in water from the ground. It is always best to store drums indoors or, in any case, under shelter.

When smaller quantities of oil than an entire drum are to be used, it is common practice to pump oil from a drum into gallon containers. The bung is then replaced and the drum may stand for some time before being disturbed again. This exchange should never be made outdoors except in dry weather, for the reason that each time the drum is opened more air is admitted and, with a partly filled drum, condensation will readily take place with variations in air temperature.

For these transfers, several drums, together with the pump and gallon containers, should be kept on hand. All oil will thus be at room temperature at the time of transfer. Preferably, each drum should be emptied into the gallon containers when it is first opened.

In one case containers were purchased, stored and used without being inspected or cleaned, resulting in dirty oil of low dielectric strength. Containers should be cleaned carefully and corked before storage.

The best practice, however, is to keep on hand a supply of oil in cans of a few gallons each obtained from the refiner. These are thoroughly cleaned and sealed when filled, as are the drums, and this prevents the possibility of absorption of moisture due to any handling.

When a drum is first opened a hissing sound is usually heard. If it is not, it means either that the bung was loose or else that the oil is at the same temperature as when the drum was filled. If no rush of air is observed, it is always well to sample and test the oil before transferring to containers, because, if the bung was loose, moisture probably has entered.

The correct procedure for sampling and testing oil is covered by instructions accompanying transformers and also by N. E. L. A. publications, but a few points that are frequently disregarded may well be specially mentioned here:

1. Do not use rubber hose in handling oil.

2. Allow the oil in a drum to settle several hours before sampling. Take samples from the bottom oil.

3. Be sure that the sampling tube is clean and dry, and also the sample jars. Use preferably glass fruit jars for the latter unless the samples must be transported a considerable distance, in which case it is best to use corked glass bottles. Do not use rubber rings or rubber corks.

4. Do not bring samples of cold oil into a warm room for test. Moisture will condense and will be absorbed by the oil.

5. Be sure that the test cup is warm, clean and dry, and that the gap is set accurately.

6. Allow the sample to stand in the cup at least one minute to allow air bubbles to escape. Slightly jar the gap before applying voltage.

7. Be sure to make proportional correction in breakdown voltage for any variation in primary voltage from that for which the test set was designed.

8. Do not be guided by individual breakdowns. Always use the average of a number of readings.

Power Factor Correction by Motors

BY F. B. WIPPERMAN
Gold Dust Corporation, St. Louis

THE Gold Dust Corporation has a total motor load of about 750 hp., with most of the motors used for individual drive. The maximum demand of the plant is about 400 hp. The company recently purchased two Fynn-Weichsel motors to be installed in connection with a new Chipso machine. In order to show the effect of the installation on the power factor, the writer collected data as to load and power factor of the plant before and after the installation.

The first readings were taken March 19 and 20, 1925, on the 440-volt secondary bus of the plant. The average day load was around 132 kw. at a power factor of less than 50 per cent. It was impossible to get the exact power factor, as the reading meter was off scale. However, an ammeter placed in the circuit compared with the watt-meter readings, indicating a power factor between 40 per cent and 45 per cent. The maximum day load on March 20 was 162 kw. at 8:15 a.m. and had a power factor of about 50 per cent. The average night load was 18 kw. with a power factor of about 68 per cent, and probably consisted of a few small motors running fully loaded.

Tests subsequent to the installation of Fynn-Weichsel motors were made between July 15 and 22, inclusive. Meter readings were first taken on the secondary bus as before and later were changed to the new panel which had been installed to take care of the new motor installation.

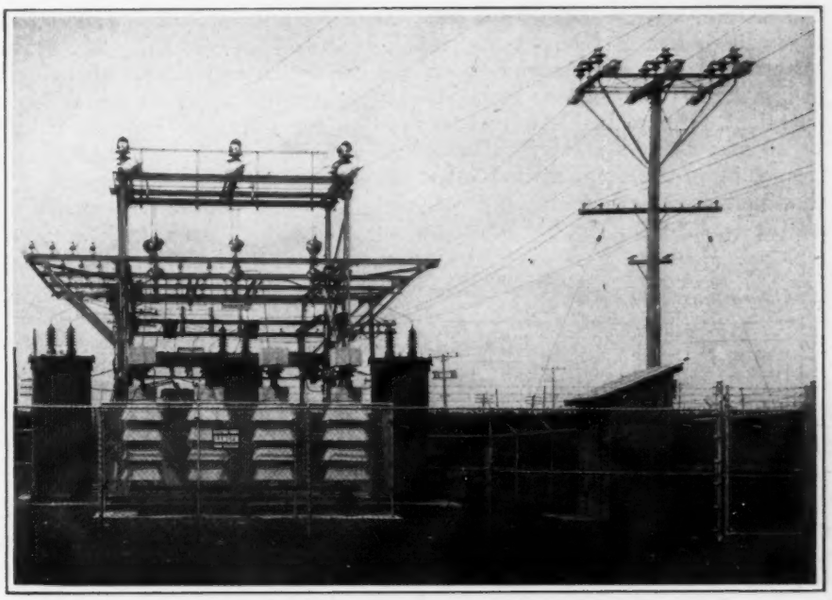
On July 15, at 2:30 p.m. the load was 132 kw. at 58 per cent power factor. The peak load was 156 kw. at 60 per cent power factor at 2:40 p.m. About 4:05 p.m. the Chipso machines and the Fynn-Weichsel motors were shut down and the load dropped to 99 kw. and less than 50 per cent power factor. On July 17, under typical conditions, the load was 156 kw. at 62 per cent power factor.

One 20-hp. Fynn-Weichsel motor drives a crusher and a second 25-hp. motor drives the blowers on one of the Chipso machines. The total connected load on the panel is 45 hp. in Fynn-Weichsel motors and 45 hp. in induction motors.

Meters were placed in the Chipso panel on July 21, and typical readings for this date were 27 kw. at 89 per cent power factor (leading) and 23½ kw. at 80 per cent power factor (leading). Only one Chipso machine was running at the time of making these tests. The minimum leading power factor occurred when the 20-hp. crusher motor was running idle, the rest of the machines being shut down. The meter then indicated 1½-kw. load at less than 70 per cent leading power factor. On July 22 typical readings were obtained as above, except that for part of the time both Chipso machines were running, but the load was 57 kw. at 99 per cent power factor (leading).

Semi-Automatic Distribution Centers

TO FURTHER better service, the Public Service Company of Northern Illinois has completed several semi-automatic distribution-center installations recently. Several communities formerly served by feeders from remote points are now served from distribution centers located close by and the service is improved by the use of automatic equipment.



MODERN OUTDOOR SEMI-AUTOMATIC SUBSTATION

A number of the old-type distribution centers with wood-pole structures have been supplanted by new steel structures, and automatic equipment has been placed on feeders that formerly had no protection other than fuses. Regulators have been added to the revised installations.

One part of each steel structure carries air-break switches, high-tension fuse mountings, choke coils and the high-tension bus. To this part are connected the high-tension lines. Another part of the steel structure carries the 4,000-volt bus, and from it emanate the 4,000-volt feeders. The high-tension lightning arresters, transformers, regulators and reclosing equipment are mounted on concrete foundations below the steel structure, and the entire in-

stallation is surrounded by a steel fence.

Reclosing equipment is used by the Public Service Company at these semi-automatic distribution centers. The equipment is designed to repeat the reclosing action three times at definite intervals, which is all that any operator could do if he were stationed there.

Meter and Instrument Test Board

Apparatus Designed by Central Hudson Gas & Electric Company for Testing Single-Phase and Polyphase Meters Is Very Flexible and Simple to Operate

BY COLBORN E. BLAISDELL
Meter Engineer Central Hudson Gas & Electric Company, Poughkeepsie, N. Y.

SOME time ago the Central Hudson Gas & Electric Company decided to install new meter test boards with better facilities for testing single-phase and polyphase meters and instruments and to expedite the operation of the meter department. Being unable to find any test board on the market with facilities for testing apparatus other than meters that would comply with all the requirements of its different districts, the company decided to have some of its own design manufactured by the States Company of Hartford, Conn.

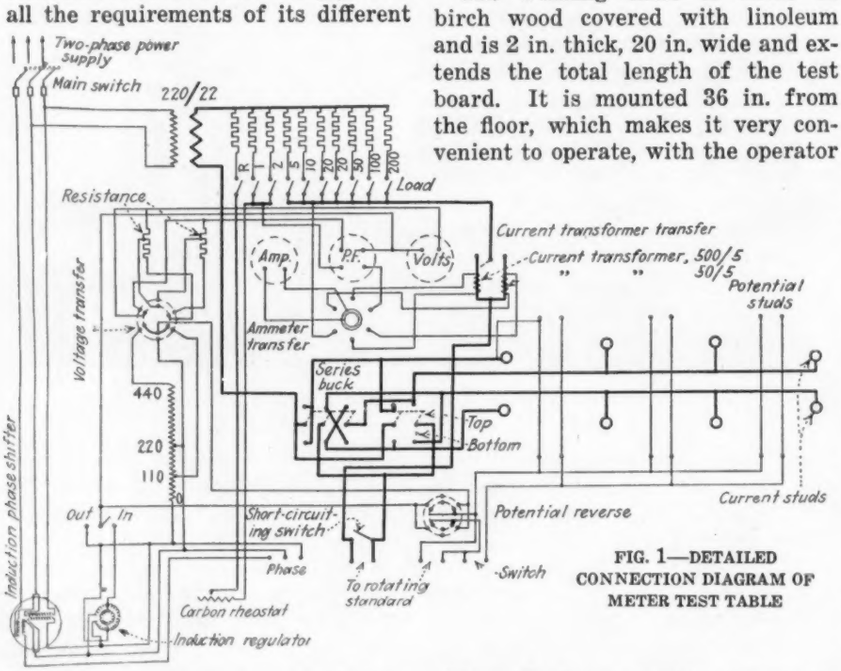


FIG. 1—DETAILED CONNECTION DIAGRAM OF METER TEST TABLE

As designed, the test boards are all the same in general with a few alterations to comply with requirements of the different districts. The board described below is fed by a separate 220-volt, two-phase, three-wire circuit from a bank of transformers, one 7½ kva. and the other 1½ kva., which enables the obtaining of a very good regulation.

The test board as shown in Fig. 2 consists of two natural black slate panels, 2 in. thick, mounted on 1¼-in. black iron pipe framework. The main or control panel is 28 in. wide and 40 in. high and contains all the switches and instruments for operating the test board. The other panel, which may be called the testing panel, is 62 in. wide and 24 in. high and contains all the connections and studs for testing and mounting the meters.

The working table is made of birch wood covered with linoleum and is 2 in. thick, 20 in. wide and extends the total length of the test board. It is mounted 36 in. from the floor, which makes it very convenient to operate, with the operator either standing or sitting in an adjustable chair.

The phase shifter, induction voltage regulator, load transformer and carbon resistor, as shown in Fig. 2, are mounted on the framework directly under the control panel, each having an individual operating dial, except the loading transformer, which is controlled by the load switches. The rotating standard is set in the standard well flush with the top of the working table, which will remain permanently, a feature that eliminates a great many possibilities of inaccuracy in the rotating standard. The test board is designed with three instruments, an ammeter, power-factor meter and voltmeter; of these, the power-factor meter has not as yet been installed. All operations of the test board are made at the main or control panel, and with a little study of the illustrations shown the different operations can be easily followed.

This panel consists of a three-pole main switch, which energizes the board through the load transformer and phase shifter, as shown in Fig. 1. The two-pole double-throw switch marked "top and bottom" is used when testing the top or lower element of polyphase meters separately or when testing single-phase meters. The three-pole double-throw switch marked "buck" and "series" is used when testing both elements of a polyphase meter. When the meter is tested with the current coil of each element in series, this switch should be closed to the position marked "series," and when a test is made balancing one element against the other, the switch should be closed to the position marked "buck," which connects the current coil of one element in the reverse direction to the other. There are nine load switches and one variable carbon resistance; thus it is possible to obtain any load from ¼ amp. to 410 amp.

The phase shifter and voltage regulator make it possible to make a test on any desired power factor or voltage by operating the two control wheels directly under the working table of the control panel. There is also a single-pole double-throw switch for disconnecting the voltage regulator when it is desired to use line voltage.

A large short-circuiting switch is mounted just above the current terminals feeding the rotating standard, for shorting the standard when not in use, thereby eliminating the possibility of accidental overload current injuring the instrument.

There are two current transformers mounted on the rear of the panel, one 50-amp. 10:1 ratio and the other 500 amp. 100:1 ratio, connected on the primary side to a single-pole double-throw transfer switch for transferring from one to the other. The secondaries of these transformers are connected through a G.E. secondary ammeter transfer switch to the ammeter, thereby making it possible to get three ranges of load on the ammeter: 0=5, 0=50, 0=500 amp.

Also there are three different

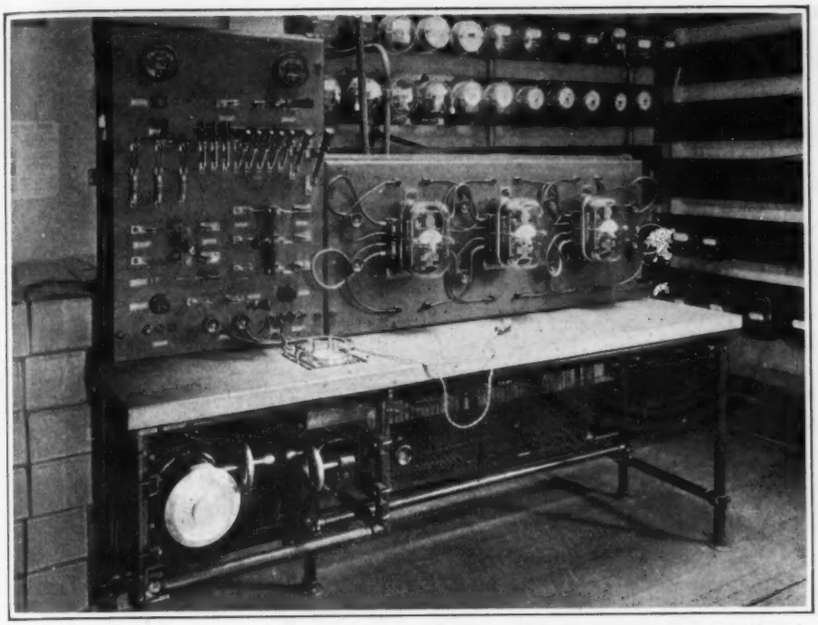


FIG. 2—WELL-DESIGNED METER TEST TABLE USED BY CENTRAL HUDSON COMPANY

voltages obtained by the use of an auto-transformer with taps at 110, 220, 440 volts, which run to the testing panel and also to a voltage transfer switch and through a series of resistors to the voltmeter, making it possible to get three ranges of voltage on the voltmeter.

The potential reverse switch shown in Fig. 1 has proved to be very convenient for returning the pointer to zero when standards are used without a reset.

It is possible to test from one to three single-phase or polyphase meters simultaneously, and once the meters are connected to the panel any test can be made without changing any connections. This test board has been in service approximately two months and has proved to be entirely satisfactory.

Supervisory Control and Indication

AUTOMATIC operation supplemented by supervisory control and indication is being used for two of the hydro-electric plants of the Wisconsin Public Service Corporation on the Peshtigo River and will also be employed for the new plant now building. Supervision is being maintained from a manually operated plant on the same river. The automatic control is designed to perform all necessary operations, but the supervisory system enables the operator at the manual station to have direct control and check conditions at the automatic plants when desirable. If anything abnormal occurs at one of the plants, the supervisory system will blow a horn at the manual station. Then the central operator can check automatically.

The manner in which operations at the automatic plants can be controlled and conditions checked is illustrated in the accompanying tables. The central operator has a dialing telephone and loud speaker connected with the supervisory circuit. If he wishes to start Unit No. 1 at Johnson Falls, he dials "11." To close the gate he would dial "23." Other opportunities for control are shown. To ascertain pond elevation he would dial "19." A low-tone buzzer would respond, the number of signals giving the desired information as indicated by the table. If an "abnormal condition" signal is automatically received or if the central operator wishes to ascertain conditions, he dials "17." In response, a high-tone buzzer and vibrating bell indicate normal or abnormal conditions respectively of the machine breakers, lock-out relay, bearings, machine temperature and high-tension feeder breakers in succession first for one unit and then for the next. By dialing "18" for gate opening and getting corresponding head on turbines by dialing "19" the load on the turbines can be checked.

Supervisory control and indication are similar for the other plants.

TABLE I—DIALING NECESSARY FOR SUPERVISORY CONTROL OR SECURING OF OPERATING CONDITIONS

(Applies to Johnson Falls Hydro station of Wisconsin Public Service Corporation)

Operation	Machine Number 1	Machine Number 2
Start	11	12
Stop	21	22
Open gate (mach.)	13	14
Close gate (mach.)	23	24
Gate opening	18	28
Trip h.-t. breaker line "A"	25	
line "B"	26	
Close h.-t. breaker line "A"	15	
line "B"	16	
Close Wausaukee switch	29	
Open sluice gate	10	
Close sluice gate	20	
Pond level	19	
Operating conditions	17	

TABLE II—MEANING OF SIGNALS RECEIVED OVER SUPERVISORY SYSTEM

(Applies to Johnson Falls station on Peshtigo River, Wisconsin)

Sequence of signals.	Operating Conditions	
Machine No. 1	High-Tone Buzzer	Vibrating Bell
1. Machine breaker	In	Out
2. Lock-out relay	Normal	Operated
3. Bearings	Normal	Hot
4. Machine temperature	Normal	Hot
5. High-tension feeder breaker	In	Out (line B)
Machine No. 2		
6. Machine breaker	In	Out
7. Lock-out relay	Normal	Operated
8. Bearings	Normal	Hot
9. Machine temperature	Normal	Hot
10. High-tension breaker	In	Out (line A)

Pond Level			
Low-tone Buzzer Signals	Pond Elevation in Feet	Low-tone Buzzer Signals	Pond Elevation in Feet
10	42.0	5	40.0
9	41.6	4	39.6
8	41.2	3	39.2
7	40.8	2	38.8
6	40.4	1	38.4

Note—No indication of pond level at 38 ft. or less.

Pond Level According to Table

Gate Opening	Kilowatt Output 10	9	8	7	6	5	4	3	2	1
10	2,300	2,200	2,000	1,800	1,500	1,300	1,000	600	500	200
9	2,200	2,100	1,900	1,700	1,400	1,200	900	500	400	200
8	2,100	2,000	1,900	1,700	1,400	1,100	900	500	300	200
7	2,100	2,000	1,900	1,700	1,300	1,100	800	500	300	100
6	2,100	2,000	1,900	1,700	1,300	1,100	800	400	300	100
5	2,000	1,900	1,800	1,600	1,300	1,000	800	400	200	100
4										
3										
2										
1										

Commercial Activities and Public Relations

Chicago's Largest Commercial Cooking Load

CHICAGO'S largest single commercial cooking load—that of the new Shoreland Hotel—was recently secured by the Commonwealth Edison Company along with the power and light load solely on the satisfied experience of the builders over nearly three years with electric cooking and purchased service at the Belden Hotel. In other words, the adoption of electric cooking and purchased power was in the nature of a repeat order based on the customer's previous experience.

The Shoreland Hotel is one of the highest-class residential and transient hotels in Chicago. Its estimated total connected load will be 2,764 kw., nearly 50 per cent more than the Belden, where the yearly consumption is about 1,400,000 kw.-hr. The total connected cooking load of the Shoreland is 1,626 kw., compared with 1,000 kw. at the Belden. The estimated connected power load is 595 kw. and the lighting load is 453 kw.

In the general kitchen of the hotel will be five electric ranges, one meat oven, four broilers, one special cooking fixture, two bake ovens, toasters, waffle irons, hot plates and miscellaneous heat applications. In addition electric power will be used for operating dishwashers, dough mixers, ice-cream machines, vegetable peelers and choppers, burnishing machines, etc. Catering to families as well as to transients, the apartments are equipped with electric household ranges, totaling 1,336 kw.

A. M. Lloyd represented the Commonwealth Edison Company as power engineer on the job, in connection with the merchandise sale of the commercial cooking devices.

TEST OF BROODERS MADE AT UNIVERSITY FARM, DAVIS, CAL.

Feb. 7 to March 18, 1925

Outside temperature ranged from 31 to 75 deg. F., with a mean daily temperature of 50.2 deg.

Test No.		64§	65	66	67	68	69	70
No. Chicks	Start	100	86	82	99	100	100	100
	End	82	81	73	90	99	92	98
	Make	Elec.	Oil	Elec.	Elec.	Oil	Elec.	Oil
	Size (in.)	42	52	42	36x48	52	41	42
Hover	Floor*	False	Concrete	False‡	Concrete	Concrete	Concrete	Concrete
	Area	1,385.4	.....	1,385.4	1,728	.....	1,320.3	.....
Max. min. temp.	Hover	63–98	62–92	59–97	60–95	62–86	64–110	62–92
	Room	50–78	62–92	53–78	55–77	58–86	50–80	60–84
Fuel†	Amount (kw.-hr.)	65.5	.....	64.3	119	.....	142.3	.....
	Pounds	.....	185/10 oz.	.....	.....	208/12 oz.	.....	202/3 oz.
	Cost	$2.62	$4.42	$2.56	$4.76	$4.97	$5.69	$4.81
Results								
Hover area per chick		13.85	.....	16.89	17.45	.....	13.20	.....
Lb. fuel chick per hr.		.....	0.00239	.....	.....	0.002195	.....	0.00215
Watts per chick per hr.		0.832	.....	0.9175	1.377	.....	1.611	.....
Fuel costs chick per hr.		$0.00333	$0.00518	$0.00365	$0.00551	$0.00522	$0.00644	$0.00511

* Brooder house floor is of concrete, over which is spread about ½ in. of false floor of 1¼-in. lath 3 in. above concrete to aid ventilation.

† Oil density 0.805, Baumé 44 deg.; weight per gallon 6.71 lb. Oil at 16 cents per gallon, or 2.38 cents per pound, and electricity at 4 cents per kilowatt-hour. The size of the rooms is 7 ft. 2 in. x 11 ft. 6 in.

‡ Was changed from concrete to false to overcome moisture trouble.

§ Comparatively high mortality due to carelessness on part of investigator working with his brood.

Electric Brooders Offer Farm Application

PRELIMINARY tests have been run on various types of electrical poultry brooders throughout the Santa Rosa and Petaluma districts by the California committee on relation of electricity to agriculture, with results shown in the accompanying tables.

The brooders are of two general types—namely, the radiant heat type and the non-glowing type. The non-glowing type appears in various forms, for both 110 and 220 volts. The chief distinction between the different styles lies in the method of ventilation, or the class of resistance wire. The radiant type is a distinctly different type of brooder and is a unique application of glowing coils. The heating here depends upon radiation almost entirely, the rays being thrown downward upon the floor or chicks.

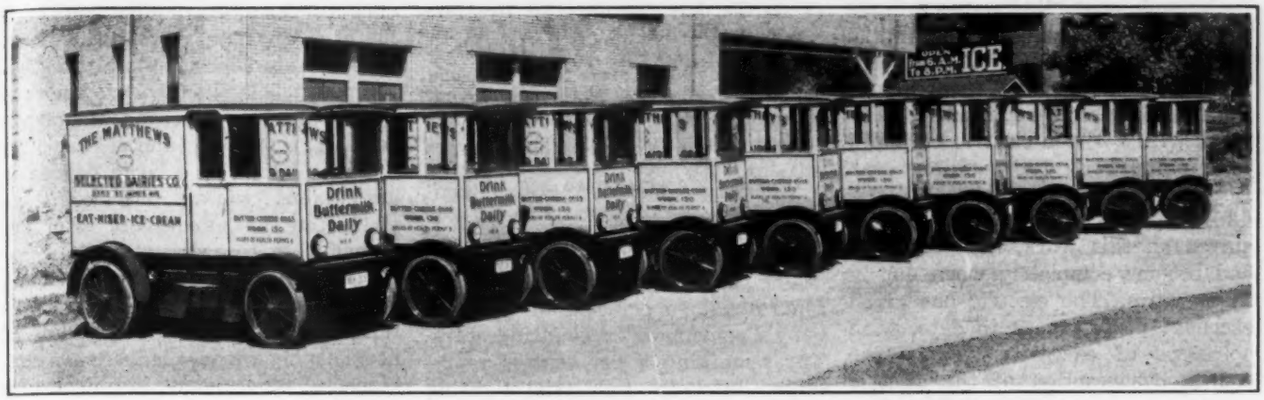
When properly operated, the non-glowing type produces good results, the power consumption ranging from 0.08 watt to 1.28 watts per chick per hour, according to the method employed and climatic conditions, and the number of chicks in the hover. With the radiant heat type there is no trouble with wet floors, sweating or ventilation, and they can be operated for about 0.7 watt per chick per hour.

Ventilation is most important, and upon it depends the success of a brooder. Without proper ventilation floors will be wet, chicks will sweat and damage to the brood is likely to result. Many improvements have been added by different poultrymen in their attempts to overcome these objections, with varying degrees of success. One large poultryman near

SOME RESULTS WITH ELECTRIC BROODERS

General				Chickens		Brooder			House				Results		
Test No.	Business*	Location†	No. Acres	Total No. in Flock	No. Baby Chicks	Number	Type‡	No. Chicks	Type	Size Rooms, Ft.	Runways	Exposure	Total Hours	Total Kw.-Hr.	Watts per Chick per Hour
1	P	Pet	5	15,000	7,600	24	N	300	Shed	12 x 14	Field	S	672	257.0	1.275
2	P	Pet	5	15,000	7,600	24	N	400	Shed	12 x 14	Field	S	672	187.2	0.696
3	P	Pet	5	15,000	7,600	24	N	400	Shed	12 x 14	Field	S	672	152.3	0.5666
4	P	Pet	5	15,000	7,600	24	N	400	Shed	12 x 14	Field	S	672	212.0	0.7887
5	P	Pet	5	15,000	7,600	24	N	None	Shed	12 x 14	Field	S	672	293.0	...
6	P	Pet	20	25,000	.....	..	N	400	Gable	.....	.....	...	480	101.5	0.5286
7	N&P	SR	90	5,200	3,000	6	N	1,200	Gable	15 x 16	Field	...	552	49.0	0.074
8	N&P	SR	90	5,200	3,000	6	N	1,200	Gable	15 x 16	Field	...	552	49.0	0.074
9	Far	SR	60	4,000	2,600	3	N	900	Shed	14 x 16	36 x 50	NE	552	118.5	0.238
10	Far	SR	60	4,000	2,600	3	N	900	Shed	14 x 16	36 x 50	NE	552	155.0	0.312
11	F&P	SR	20	6,000	3,000	3	G	950	Gable	18 x 22	Yard	S	528	383.0	0.763
12	P	Seb	5	.....	.....	..	N	175	Shed	8 x 12	8 x 50	E	528	63.0	0.682
13	F&P	H	60	3,000	2,000	2	G	1,000	Shed	16 x 20	Yard	S	...	.....	.....

* Poultryman; nuts; general farmer; fruits. † Towns are: Petaluma, Santa Rosa, Sebastopol, Healdsburg. ‡ N = non-glowing; G = glowing or radiant.



TEN ELECTRICS SUPPLANT HORSES AND WAGONS FOR MILK DELIVERY

Petaluma had trouble with sweating and designed a new ventilation system. He employs a false floor about 3 in. high, below which is installed a system of heating coils similar to those used in the hover proper and in parallel therewith. The temperature of this floor, upon which the chicks sleep, is about 75 deg. F. The hover is kept full of fresh air and the floor is dry. His costs, however, are higher, due to the large amount of surface that must be heated, the power consumption ranging from 0.6 watt to 1.28 watts per chick per hour.

Another large poultryman at Sebastopol has installed a 100-watt radiant coil in a 4-in. vent pipe in the floor of the hover. This coil is on a separate wall switch and is non-automatic, there being four separate wires to the hover. The heated coil causes the air to rise faster, thereby increasing the air circulation through the hover. The power consumed is about 0.7 watt per chick per hour, the floor is dry, there is no sweating, and the chicks seem healthy. During favorable weather the automatic coils may be disconnected entirely, the radiant coil producing all necessary heat.

Although it is too early at present to draw conclusions, one can easily see that under California conditions chicks can be brooded successfully by electricity at a power consumption of 0.08 watt to 1.28 watts per chick per hour. Either convection or conduction or radiation can be employed. Unless precautions are taken, however, sweating, wet floor and unhealthful conditions are possible with the non-glowing type, whereas the radiant type may carry a fire hazard but has none of these disadvantages.

Electric Trucks Overcome Cincinnati Hills

FOR ice, coal and milk delivery and utility maintenance service, several fleets of electric trucks are in successful operation in Cincinnati, a city well known for its hilly streets. Within the last year twenty additional electric trucks have been put in service and they are performing more work at lower cost than the equipment formerly used.

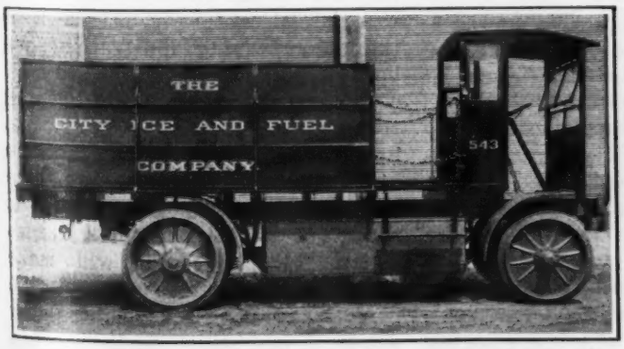
One of the Matthews Selected Dairies Company's milk delivery routes, 21 miles long with 209 stops, is now handled by an electric truck in less time than by horse and wagon and the driver covers 31 miles, making 270 stops. Some of the hills negotiated are 1¼ miles long, indicating the practicability of electrics under these severe conditions.

The operating costs of the electrics have been very low. The owner figures the daily operating cost of the electric (exclusive of fixed charges on chassis) as follows:

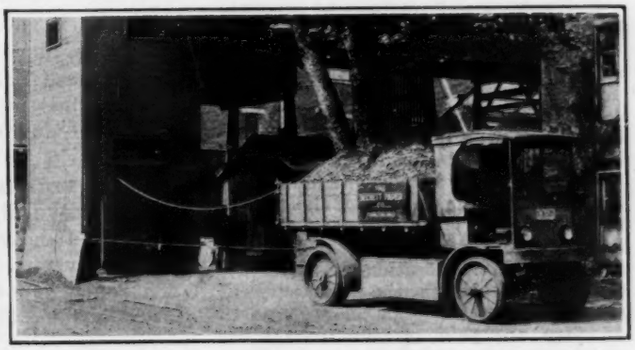
Battery charging	$0.30
Battery replacement (54-month life)	0.60
Total daily power operating cost of electric	$0.90

The daily cost for horse and wagon was $1.40 per head, and as three horses were necessary for each route, the total daily horse expense was $4.20, or a saving of $3.30 per day in favor of the electric.

The City Ice & Fuel Company replaced two wagon units and four men, putting out 18 tons of ice per day, with one 5-ton electric and three men, who put out 26 tons in one day. The daily expense for battery replacement and recharging of the truck does not exceed $1.25. Gasoline trucks of the same size on similar work cost $3.20 per day for gasoline alone. The electric truck replaces four horses at $1.25 per day



FIVE-TON ELECTRIC EQUIPPED WITH DELIVERY GATES REPLACES TWO WAGONS AND FOUR HORSES, SAVING ONE MAN'S LABOR



A 3½-TON "DUMP" BODY TRUCK DOES MISCELLANEOUS HAULING AROUND AN INDUSTRIAL PLANT

each, and saves the wages of one man—a gross saving of more than $9 per day.

Some months ago the Beckett Paper Company replaced a gas truck with a 3½-ton electric, equipped with dump body for handling coal. Because of the frequent stops and difficult maneuvering that are required on this work, the gas truck had become completely worn out in three years. The electric has given excellent performance to date, with no signs of excessive wear. The energy consumption of the electric amounts to 24 kw.-hr. per day when moving 70 tons of coal from railroad track storage into the power plants and for ash removal.

Customer Accounting Without Ledgers

THE Dayton (Ohio) Power & Light Company some time ago adopted a system of machine billing and bookkeeping for customers' accounts involving considerable change in working schedules and division of labor. Marked savings and advantages have been realized under the new system and B. C. Taylor, auditor of the company, has analyzed these as follows:

1. Definite schedule for all work.
2. Discontinuance of periodical rewriting of ledger accounts.
3. Elimination of daily opening and closing of ledger accounts.
4. The entering of meter data in two places—namely, the ledger and meter reading records have been reduced to a point where they are carried only on the meter-reading record.
5. Discontinuance of bill entering.
6. Practical elimination of 80 per cent of cash posting.
7. Analyzation of control sheets by classification of revenue is advantageous for rate analysis.
8. Neat machine-made bills, totaled mechanically, accumulated on proof sheets, permitting accurate determination of income and kilowatt-hour reports.
9. Handling only delinquent accounts for balancing purposes.
10. Eighty per cent of accounts balanced immediately at end of discount period.
11. Immediate application of journal entries.
12. Continuous discount period.
13. Handling only delinquent accounts in sending notices of deliquency to customer.
14. Collection of delinquent accounts is given better attention. This is accomplished through the simplicity of the system, as all items are eliminated as they are paid, so the unpaid accounts come to attention more readily.
15. Bills are issued with greater speed, thereby reducing the time between the date the meter is read and the date the bill is delivered to the customer.
16. Changes in forms to meet special conditions may be made any month without affecting the system.
17. Greater efficiency by specialization of operations.
18. Less storage space required for records.
19. Ability to reroute any portion of territory more easily.

The plan in effect at Dayton represents about 95 per cent of the company's consumers' accounting work. The remaining 5 per cent is represented by large industrial lighting and power customers, municipalities and special accounts, of which a chronological ledger record is desired. The success of the plan has been due, Mr. Taylor says, to machine bookkeeping, a definite working schedule throughout the consumers' accounting, credit and collection departments, and to complete division of labor. Departmental operations are based on a schedule of twenty-one working days, leaving Saturdays for miscellaneous and overflow work. Machines used in preparation of bills and keeping records include: Automatic Addressograph; Burroughs billing machine, adding machines, Cummins receipting machine, Underwood manifolding typewriter.

Alteration tickets are used in connection with adjustments and constitute the duplicate record of an entry. These tickets are issued by the balancing group the first of each month, are numbered consecutively and are held until end of month, when they are sorted, listed and the earnings classified and total of money and kilowatt-hours included in the month's revenue.

The only important disadvantage of the system, Mr. Taylor reports, is the absence of the chronological accounting record of each customer's transactions in one place for reference in cases of inquiry and complaint. The use of kilowatt-hours rather than dollars, in analyzing bill complaints, lessens the seriousness of this disadvantage, because the meter-reading record only, and not the office record, is used to a large degree in adjustment work. The comparatively few cases requiring reference to complete records entail little expense compared with the savings effected by other features of the system. The users of this system of bookkeeping without ledgers are convinced of its economy, at no sacrifice of the essentials of proper accounting.

Checking Refrigerator Servicing Costs

IN THE MINDS of central-station men the number and cost of service calls necessary to the efficient operation of domestic refrigerators will have an important bearing on the acceptance of these devices by residential customers and also in determining the central-station companies' future sales and service policy. That accurate records of all refrigerator service calls will be available, Cyrus Barnes, general sales manager of Charles H. Tenney & Company, Boston, is keeping a close check on all installations on the lines of subsidiary companies.

A special card form, as shown in the accompanying illustration, has been prepared and furnished to each company for the purpose of keeping records of refrigerator service calls. Space is provided for noting the time and expense involved and the nature of trouble requiring attention. At the end of twelve months, Mr. Barnes believes, these records will make available considerable data on the performance of these machines under practical operating conditions and afford a basis for approximating the probable service expense.

Name of User — Home Address

Make of Machine — Size — Type — Serial

Complete Unit — Where located

Date of Installation — Installed By

Terms of Sale

SERVICE CALLS

Dates	Time Spent	Expense	Nature of Complaint								
			Thermostat	Belt	Expansion Valve	Idler Pulley	Compressor	Motor	Water Trouble	Condenser	Miscellaneous

FORM USED FOR RECORDING NUMBER AND COSTS OF REFRIGERATOR SERVICE CALLS

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

Stave Falls Development in British Columbia.—This is a description, copiously illustrated with drawings and views and presenting a considerable quantity of data on the hydraulic and constructional features, of the work involved in the enlargement of a plant on a tributary of the Fraser River, 36 miles east of Vancouver, B. C. The station capacity is increased by raising the height of the dam by 22 ft., driving a 3,600-ft. tunnel to interconnect two lakes, rebuilding the units for the increased output obtainable at the higher head and adding to the installation. The total installed capacity will be 65,625 kva., and the annual output will be increased from 150,000,000 kw.-hr. to 250,000,000 kw.-hr. — *Engineering (England)*, Sept. 4 and 18, 1925.

The 1,200-Lb. Boiler and Turbine at Weymouth.—The article gives details of the new high-pressure boiler and turbine unit soon to be placed in operation by the Edison Electric Illuminating Company of Boston and explains the method of operation. — *Power*, Sept. 15, 1925.

Water Power and Steam Power.—STEN VELANDER.—This paper is an important contribution to the subject of economical comparisons between water power and steam power. It is written with Swedish conditions in view, but a great deal of the material has been obtained from other European countries. The author maintains that the accepted standards of comparison between the two possibilities of future development in Sweden do not place some of the important features of water-power development in their proper light. His conclusions, based on very carefully discussed figures, indicate that future development in Sweden should be centered on water power, and that steam-power generation should be used only in cases where waste material from sawmills and similar fuels are available.—*Teknisk Tidskrift* (*Swedish*), *Elektroteknik*, Sept. 5, 1925.

Generation, Control, Switching and Protection

Use of Induction Regulators in Feeder Circuits.—LAURENCE H. A. CARR.—The major portion of this paper consists of an analytical discussion of the performance of induction regulators for three-phase power circuits, with the aid of vector diagrams and the loci derived from them, for various conditions of operation. Two main fields of application are considered—the control of the voltage at the remote end of a supply feeder and the control of power factor and thereby to some extent of the transference of power along a feeder connecting two or more generating stations. The types analyzed are the single polyphase regulator, the double polyphase and the bank of single-phase regulators. As to automatically controlled regulators, the author quotes the results of oscillograph tests on a 346-kva. unit which showed that the motor reached full speed within one-fifth second of the operation of the voltage relay. Large regulators are stated to move from full 10 per cent negative to an equal positive boost in from twenty to forty seconds. For costs (in England) he gives £3 to £4 per kva. of regulator at 50 cycles, which with 10 per cent buck or boost is equivalent to 75 cents to a dollar per kva. of load.—*Journal of I.E.E.* (*England*), September, 1925.

Signaling Apparatus for Transformers.—R. DIACON.—The operation of large power transformers depends mainly upon the perfect performance of their cooling apparatus. Such transformers are as a rule installed outdoors, where they are out of ready reach of the operator. For this reason a Swiss concern has standardized a remote-control supervising apparatus, keeping tabs automatically on the various vital factors for the safe operation of large transformers. Contact-making relays are installed on the water flow and the oil flow, the top-oil thermometer has a contact, and a pressure gage with a contact is attached to the tank of the transformer. Lines from these four points are carried to the switchboard, ending in an annunciator and an acoustical alarm signal. Stoppage of water or oil flow, too high oil temperature or an undue internal pressure in the transformer tank are thus automatically signaled to the operator. The compactly built control apparatus has proved its value in several large stations.—*Brown-Boveri Mitteilungen*, September, 1925.

Transmission, Substations and Distribution

Engineering and Economic Features of Distribution Systems Supplying Increasing Load Densities.—L. M. APPLEGATE and W. BRENTON.—The authors' thesis is that whereas the generating and transmission systems of a central station are usually carefully planned for economy and future growth, this is not always true of the distribution systems, these being made up of such a multiplicity of small things that the opportunity for savings is not so apparent. The present paper is an outline of the method followed in making a study of the distribution system of the Portland (Ore.) Electric Power Company. To forecast the growth of population to be served a curve of a form shown by Pearl to represent the increase in density of population and having the equation

$$Y = \frac{3{,}000}{1 + e^{4} - 0.05x} + 300$$

is used, the constants for the city having been derived from historical data. The 2,300-volt, three-phase circuits are to be changed over for 4,000-volt, four-wire operation with grounded neutral, the latter being used in common with the three-wire low-voltage lighting circuits. Economic considerations are dealt with graphically and analytically, curves being plotted for various localities and kept revised for quick reference when extensions are needed.—*Journal A. I. E. E.*, September, 1925.

Stored Mechanical Energy in Transmission Systems.—J. P. JOLLYMAN.—The paper considers the influence of the stored mechanical energy in the moving masses connected synchronously to a transmission system during changes in load, in input and in transmission capacity. An abstract of the discussion on the group of papers of which this constitutes one may be found in the ELECTRICAL WORLD report of the Pacific Coast convention of the A. I. E. E., Oct. 3, 1925, on page 691.—*Journal A. I. E. E.*, September, 1925.

Mechanical Characteristics of Transmission Lines.—VIII, Transmission Towers, Transpositions, Construction Materials and Foundations.—L. E. IMLAY.—The present installment is largely descriptive. Its nature is indicated in the subhead of the title.—*Electric Journal*, September, 1925.

Units, Measurements and Instrument

Electrolytic Meter.—K. KESSLER and W. KRUKOWSKI.—The simplicity, accuracy and cheapness of electrolytic meters for small consumers of direct current make this type of instrument a sharp competitor with the motor meter. A modern type has recently been placed on the market and has been passed as legal by the German Bureau of Standards. It is an ampere-hour meter which dissociates a 20 per cent phosphorous-acid solution and measures in a calibrated vertical glass tube the amount of hydrogen developed. A modified Hatfield hydrogen cathode is used. At rated current a drop of 0.5 volt exists across the meter terminals, while 0.05 to 0.1 milliamperes passes the electrolytic cell. After 100 kw.-hr. to 800 kw.-hr. (according to current and voltage) has passed the meter its glass tube is completely gas-filled. A simple reversal of the meter fills the tube again, making it ready for further service. Thirty thousand or more of these simple meters are already installed and have given satisfactory operation. — *Elektrotechnische Zeitschrift*, August 27, 1925.

Accuracy of Alternating-Current Test Instruments.—S. C. HOARE.—Various influences affecting the accuracy of instruments, especially when used on a long, continuous run, are taken up in succession, and methods are described whereby they are more or less completely counteracted. Curves show the variation of indication with time under maintained load for several different types of instrument.—*Journal of A. I. E. E.*, September, 1925.

Dielectric Loss Measurements on Commercial Insulating Materials.—C. DANNATT.—The article deals with a complete equipment designed for laboratory tests on the dielectric losses of insulating materials at power frequencies and working stresses and temperatures. The design, calibration and

performance of an oil-immersed electrostatic wattmeter are described, whereby power factors can be determined to 0.002, and possibly more accurately, on the larger volt-ampere loads, and losses to within a few thousandths of a watt, using voltages up to 30,000 on the specimen. Matters relating to the auxiliary apparatus, such as the electrode arrangements, transformer connections, and measurement of direct-current insulation resistance, are also discussed.—*World Power*, September, 1925.

Motors and Control

Effect of Unbalanced Secondary Conditions on the Operation of Large Induction Motors.—A. F. KENYON.—A recapitulation is given of earlier tests by Gazda, from which the conclusion was reached that polyphase induction motors up to 50 hp. may safely be operated at continuous full load with unbalanced secondary resistances in the several phases without materially affecting the temperature rise. An investigation is then reported of disturbances due to such unbalance in the case of a 1,000-hp. motor. Because of inequality of the external secondary resistance the current in one phase was only 65 per cent of that in the other two. Oscillograms and torsiograms taken during the investigation are reproduced. It is shown that operation of large induction motors with unbalanced secondary conditions will produce objectionable pulsating torque and vibration of the motor, and if the capacity of the supply system is of the same order as that motor, serious trouble may arise from vibration of the turbo-generator units.—*Electric Journal*, September, 1925.

Large or Small Motors for Industrial Plants.—MORGAN G. FARRELL.—In this paper some specific comparisons are instituted between the cost of installation of individual and group drive, the illustrations being drawn from cotton, mill and woodworking practice. The former indicates a cost when using group drive less than one-third of that with individual drive.—*Power Plant Engineering*, Sept. 1, 1925.

Contactors for Industrial Motor Control.—Part III.—W. WILSON.—This, the concluding part, deals with the details of coil design, contacts, magnetic blow-outs and off-stops.—*World Power*, September, 1925.

Heat Applications and Material Handling

Electric Furnaces for Metallurgical Purposes.—V. ENGLEHARDT.—The article, which condenses a talk given by the author before the Austrian electrochemical society, reviews the progress made during the last quarter century in the use of electric furnaces for metallurgical purposes. After a short theoretical introduction the writer describes various types of furnaces, such as arc, resistance and induction. Each of these types has a number of well-known representative constructions, which are described briefly. Operating experiences are given, and the furnace is shown as a drawing or a photograph. A specially enlarged section deals with production of pig iron and its subsequent refining into steel. Statistics show that a very large percentage of all high-grade steel is made electrically today. For example, of all such steel used in France, Germany, the United States and Italy, 80, 83, 92 and 100 per cent respectively are refined electrically. Tabulations given show kilowatt-hour and electrode consumption, time of melt and other characteristics for the various furnaces. The last three pages of the paper are devoted to furnaces for iron alloys, zinc and brass.—*Elektrotechnik und Maschinenbau*, Aug. 16 and 23, 1925.

Traction

Electric Drive for Gasoline-Propelled Motor Buses.—HENRY S. BALDWIN.—The first important use in this country of electric drive for motor buses was in 1904, when an experimental bus was built for operation on Fifth Avenue, New York. From this beginning the author traces the progress of the gasoline-electric bus to the present time. Circuit diagrams, performance curves and views accompany the descriptions.—*General Electric Review*, September, 1925.

Japanese Electrifying State Railroads.—H. C. HICKOCK.—There are in Japan proper, exclusive of colonies, about 13 route-miles of railway per 100,000 inhabitants and over 5 miles per 100 square miles of area. This mileage has been constructed within fifty-three years. Enormously rapid growth of traffic points to electrification as the most practical means of meeting the country's needs. For trunk lines direct current at 1,500 volts has been decided upon. The present article describes electrifications now in progress or in prospect for the near future, with a map, profiles and other data regarding the lines and the rolling stock.—*Electric Railway Journal*, Sept. 12, 1925.

Electrophysics, Electrochemistry and Batteries

Making Pure Iron Commercially.—Iron of such purity that it is difficult to analyze for the metalloids is being produced by depositing it electrolytically upon a steel mandrel through the use of ferrous chloride and using anodes of blast furnace iron. An average for a two-weeks' run follows:

	Per Cent		Per Cent
Fe	99.966	Mn	0.000
C	0.004	Pb	0.000
P	0.003	Ni	0.000
Si	0.004	Cu	0.017
S	0.006		

In the cell house one battery of thirty-five cells is now in operation, each cell being a concrete box 16 ft. long, 2 ft. 3 in. wide and 2 ft. 1½ in. long, with an inside length of 13 ft. 3 in. To overcome its porosity the concrete is impregnated with sulphur. The mandrel is 9½ in. in diameter and is rotated at a definite speed. It takes about thirty-one hours to deposit a thickness of 0.1 in., using 170 volts for the group, or 5 volts per cell. The current density is not stated. Stripping is accomplished by rotating the tube while subjecting it to the pressure of three rollers, thereby expanding the deposited metal, which is then slid off. As delivered it is hard and brittle, and this condition is overcome by annealing in an electric furnace at about 1,600 deg. Deep stamping to a degree not possible with soft steel without excessive annealing costs can be performed with this material. In drawing it down an unusual number of passes may be made between anneals. Its desirable properties are great density, high heat conductivity, extreme malleability and great resistance to corrosion.—*Iron Age*, Sept. 10, 1925.

New Addition Reagent for Electrolytic Refining.—Taking the place of glue, and at a fifth of the cost, a new addition reagent has been found for use in the electrolytic refining of lead, copper and tin with acid electrolytes. It is a sulphite liquor cencentrate comprising the solid or viscous materials obtained from the waste liquors of wood-pulp manufacture. Compared with glue it is stated to form smoother, more adherent and denser deposits.—*Engineering and Mining Journal-Press*, Sept. 26, 1925.

Telegraphy, Telephony, Radio and Signals

Design of Telephone Receivers for Loud-Speaking Purposes.—C. R. HANNA.—This paper begins with a comparison of various forms of electromagnetic receivers in present-day use which brings out some of the limitations of the simple bipolar type. A new form, called the balanced armature type, is described. Two pairs of polar projections are used, the flux due to the permanent magnets normally passing perpendicularly through the diaphragm, but not along it. Current in the coils weakens the poles on one side of the diaphragm and strengthens those on the other, thereby causing an unbalanced pull and consequent displacement. The details of design are worked out, and the application of the resulting formulas is shown by an illustrative example.—*Proceedings I. R. E.*, August, 1925.

Recent Advances in Wireless Propagation Both in Theory and Practice.—A. S. EVE.—As the title indicates, this paper is a review—quite a brief one, in fact—of recent progress. The use of reflecting wires, arranged in a parabola with the transmitting aërial in the focus line, reduces the power required for a given transmission to a remarkable degree. A distance needing 10,000 units with a plain aërial requires only twenty-five units with a two-wave aperture parabolic reflector and only 1.56 units with an eight-wave aperture. The signaling is, of course, directional. Other advances include better knowledge of short-wave transmission, further analysis of the causes of bending of the waves so that they follow the curved surface of the earth and the study of wandering waves, introducing phenomena similar to those of double refracting crystals in optics.—*Journal of Franklin Institute*, September, 1925.

News of the Industry

McKenzie Expects Offer

Chairman of Muscle Shoals Commission Hopes Also for Unanimous Report on Project

THE President's Muscle Shoals Commission has been led to believe that offers for the government's properties on the Tennessee River will be forthcoming from responsible interests. An nouncement to this effect was made by Chairman McKenzie on October 20. He admitted having correspondence recently with those interested in the Hooker-White-Atterbury offer. A new offer from that interest, Chairman McKenzie thinks, would be substantially the same as that submitted at the last session of Congress, which proposed a form of partnership with the government.

A determination by the commission to receive the press has followed the unfavorable reception which greeted its formal action on October 5 in passing a resolution binding each member to give out nothing for publication. Mr. McKenzie told the newspaper representatives that he hopes a unanimous report can be sent to the President, but he was evidently far from confident on this point. He said the drafting of the report had not begun and that the opportunities of reaching common ground had not been exhausted.

The chairman emphasized his personal opposition to any separation of power and fertilizer operations. He believes the project should be leased as a whole. He favors the further development of the Tennessee River and expressed satisfaction that the government had sold none of its lands in the vicinity of the plant. If it should be desirable to induce industries to locate at Muscle Shoals, the government through its land ownership could provide a site.

While the commission hopes to complete its report so as to lay it before the President on November 1, it is recognized that it may not be possible to conclude the report by that time. The President has asked that the report be submitted not later than November 15.

Wilson Dam Reservoir Now Full

A full head has been finally built up in the pool behind the Wilson Dam at Muscle Shoals. When the permanent switchboard shall have been completed to the point where two generators can be operated at once, this will make it possible to deliver 50,000 kw. of hydro-electric power for distribution in the Southeast. General Harry Taylor, the Chief of Engineers, has spent this week at Muscle Shoals in conference with Major Fiske and Major Tyler on matters pertaining to the further development of the Tennessee. The opinion of the Chief of Engineers on this point is certain to be asked, it is believed, in connection with the report which will be made by the Muscle Shoals Commission.

Maryland Governor Takes Part in Conowingo Tangle

In a comprehensive statement to the Maryland Public Service Commission covering the Conowingo situation, Governor Ritchie last week refused to ask the commission to delay authorization of the project pending appointment of a committee to protect Maryland's interests, as requested by People's Counsel Clarence W. Miles. The Governor expressed belief that the commission now has power enough to regulate such public utilities.

Declaring that he will "assume responsibility," he advised the commission to carry out its plan to confer with the Pennsylvania commission. He offered personal assurances to the people of Maryland that ample protective provisions will be inserted in any authorization given to the project. The Governor said he would sit with the commission before final action.

Supreme Court Refuses Review of Squier Patent Case

The decision of the lower courts in favor of the American Telegraph & Telephone Company in the suit brought against the company by General George O. Squier and involving use of the patents for "wired wireless" by which multiple messages may be sent simultaneously over the same telephone line will stand, the United States Supreme Court having on October 19 refused to grant a writ of certiorari sought by General Squier to review the proceedings.

In the brief for General Squier it was contended that the suit involved the interpretation of the government officials' patent act of 1883, and that if the decision of the lower courts stood, no government employee could enjoy a monopoly of a patent he invented during his government service. The lower courts, however, did not decide the case so much on the 1883 law as they did on a statement issued by General (then Major) Squier in 1911 when he announced to newspaper men that the patent was for the use of the public. General Squier maintained that a patent granted to a government employee and dedicated by him to the public was for the sole use, without infringement, of any one only so long as used in the public service and that it could not be used for private purposes without the consent of the patentee.

The refusal of the Supreme Court to hear the case leaves the patent rights of government employees in the same nebulous state that has existed for some years.

California Edison's Budget

Thirty-two and a Half Million Dollars to Be Appropriated for Expansion in Coming Year

INCREASING its annual expenditures for construction, extensions and betterment by $7,000,000 as compared with last year, the budget of the Southern California Edison Company for 1926 will be the largest in the history of the company, amounting to $32,558,000. The principal items in the tentative budget are $10,958,000 for additional water-power development on the Big Creek-San Joaquin project and a new transmission line; $8,000,000 for the completion of the new 70,000-hp. addition to the steam plant being constructed at Long Beach, with provision for additional units in the future, together with $13,600,000 for additions to substations and extensions to distributing lines to serve new customers.

Included in the item of $10,958,000 for additions to water-power development will be the cost of completing the Florence Lake reservoir to a total capacity of 60,000 acre-feet, the construction of a tunnel 13 ft. in diameter and 6¼ miles long between Huntington Lake and the new Shaver Lake reservoir, and the first year's work on the Shaver reservoir itself, which will ultimately have a capacity of 138,536 acre-feet and will be the largest on the company's system. Money is also included for beginning construction of the 115,000-hp. generating station to be built on Big Creek. Construction work on the 225-mile, 220,000-volt transmission line to convey the water power so generated from Big Creek to southern California will be actively carried on during 1926.

Increasing the capacity of the Long Beach steam plant to 260,000 hp., the new 70,000-hp. addition will be the largest steam turbine as yet installed west of the Mississippi River. More than seventy-five substations will either be built new or will have their capacities materially increased during the coming year, and the lines serving these substations and distributing the power from them are some of the items on which the $13,600,000 for additions and miscellaneous betterments will be spent.

Edison Association Meets at Hot Springs, Ark.

The Association of Edison Illuminating Companies met at Hot Springs, Ark., from Tuesday to Friday of this week behind closed doors. Special trains from New York and Chicago brought the major portion of the delegates. On the return trip the special to New York was scheduled to stop at Muscle Shoals Saturday morning to enable the delegates to view the great hydro-electric development made by the government at that place.

Debate Hydro Exportation

Animated Interchange of Arguments at Montreal Meeting of Civil Engineers' Society

A LIVELY debate on the subject of the exportation of Canadian hydro-electric energy to the United States was waged between leading engineers of the two countries at the annual convention of the American Society of Civil Engineers held in Montreal, October 14 to 16 inclusive.

The discussion followed an address by Ira W. McConnell, vice-president of the Dwight P. Robinson Company, New York, on "Some Economic Aspects of Hydro - Electric Development in Canada." Mr. McConnell endeavored to show by import and export figures that the two nations are in a large degree interdependent and that the export of Canadian water power now running to waste to the United States would be beneficial to both. Julian C. Smith, vice-president of the Shawinigan Water & Power Company, contended in reply that there is no waste so long as no development has taken place and no money has been spent.

"In my opinion," Mr. McConnell declared, "there is no threat of a shortage of power for Ontario and Quebec, likely to be aggravated by exportations to the United States, prior to the end of the present century. The favorable location of Canada for exportation of power due to the nearness of the large undeveloped waters in Canada to industrial districts in the United States is an opportunity for immediate profit to Canada and not a menace to its future prosperity." Mr. Smith endeavored to refute this argument by asserting that the export of power on the scale desired by American promoters will provide the United States with a supply of low-priced energy to build up industrial communities in direct competition with those of Canada. He thought that if the combined power requirements of Quebec and Ontario are met without regard to provincial boundaries, all available and economically feasible power sites within striking distance of the international border will be under development well within twenty-five years to meet wholly Canadian requirements. Within a generation, Canada, instead of having surplus power, will be contending with serious power shortage.

Mr. McConnell pointed out that the effect of export of Canadian water power to the United States is to conserve coal and diminish the amount of labor employed in the United States in generating power and in mining and transporting coal rather than to reduce materially the cost of power in the United States. Waste of United States coal is detrimental to Canada as well as the United States because Canada now imports 22,000,000 tons for use in connection with the development of only 15 per cent of the water power in Ontario and Quebec, so that Canada might need to import 150,000,000 tons for use in connection with water power if all power were used internally.

To this Mr. Smith replied: "If the most desirable and largest water powers in central Canada are developed primarily for exportation purposes, the industrial progress of this country will be thwarted. It will never be possible to recover such power."

Power Restrictions in Georgia Lifted as Rain Comes

Rains in almost every section of Georgia, amounting to more than one inch of rainfall in three days, have broken the drought that has existed since last April and have enabled power companies in every section of the state to restore at least partially service curtailed for lack of water.

In Atlanta the Georgia Railway & Power Company, while issuing a formal warning to customers not to waste power and stating that the rains up to the date of the notice had not filled the reservoirs, has resumed "white-way" lighting of the streets, taken the 50 per cent cut in service off elevators and office and display lighting and is planning to restore recent cuts in the trolley service of the city. It is expected that the "night work" orders of industrial firms will soon be lifted and the situation restored nearly to normal. In Macon the Macon Light & Railway Company, which had made a 50 per cent cut in the street-car service of the city, has restored service. In Athens emergency measures taken four weeks ago by the Athens Railway & Electric Company to conserve electric power have been canceled.

Power Club Studies Industry Development

Fall Meeting Notable for Survey of Statistical Possibilities in Manufacturing and for Canvass of Simplification in Organization of Manufacturing Branch

THE manufacturing branch of the electrical industry is alert to take advantage of every opportunity for development and economy if a cross-section of the program carried out at the fall meeting of the Electric Power Club is a true indication. At Briarcliff Manor, N. Y., where the fall meeting of the club was held on October 19-22, forward steps were taken which involve potential benefits to the whole electrical industry. The address of President Alfred E. Waller, published in abstract on page 873 of this issue, outlined the general situation admirably and pointed the way to many possibilities for greater service.

One of the outstanding sessions dealt with the collection and dissemination of manufacturing statistics. Legal counsel has ruled that the electrical manufacturers may collect and disseminate statistics of the following character:

(1) Information as to the average cost of its members' products. This may include the cost of raw materials, direct and indirect labor expense and selling or distribution expense.

(2) The volume of production. As in the case of Item (1), this may be given for some typical sizes or types, as, for instance, 1-hp. general-purpose motors.

(3) The actual price which the product has brought in past transactions.

(4) Stocks of merchandise on hand.

(5) Approximate cost of transportation from the principal points of shipment to the points of consumption.

A full discussion of statistical possibilities within the industry was had on Tuesday evening, and the Power Club went on record as favoring a study of the subject by the sections and the board of governors in order to determine the advisability of collecting and disseminating statistical information which might be valuable to the industry and to the public.

Another notable suggestion was discussed on Tuesday night. This dealt with the advantages and disadvantages of reorganizing the manufacturing branch of the electrical industry to bring about more effective administration and in order to eliminate delays. At present, as Clarence L. Collens, 2d, pointed out, the manufacturing industry has the following organizations: (a) The Electric Power Club, which consists of manufacturers of power equipment and apparatus; (b) the Associated Manufacturers of Electrical Supplies, which consists of manufacturers of supplies, materials and devices; (c) the Manufacturers' Club, which consists of executive members of manufacturing organizations; (d) the Electrical Manufacturers' Council, which is made up of the boards of governors of the three foregoing organizations and an advisory committee from the industry at large. With this type of organization much cumbersome procedure is involved in getting united action on matters of interest to the industry and much time is consumed.

A thorough canvass of the industry situation and of possibilities under some scheme of reorganization took place, and the meeting adopted a motion instructing a committee to study methods of reorganization further with the aim of presenting a concrete plan.

In addition to these topics the meeting heard and discussed other very important matters. The good work done in improving uniform codes and bringing about their adoption was outlined; the status quo in regard to electrical imports was announced and debated; the favorable reception accorded the Electric Power Club standards was accented by S. N. Clarkson, the executive secretary, and in addition thoughtful addresses and papers were given on such topics as "The Responsibilities of Leadership," by H. C. Spillman; "The Philosophy of Merchandising," by James Burke, F. R. Fishbach, J. S. Knowlson and Charles H. Strawbridge, and the progress of the program of simplification and standardization in industry by a representative of the Department of Commerce.

The sections of the club announced good progress, and entertainment left nothing to be desired.

Diamond Creek License Debated

Animated Argument on Colorado River Situation Before Federal Power Commission, Which Takes Authorization of Project Under Advisement

AFTER two days of further hearings on the application of James B. Girand for rights on the Colorado River at Diamond Creek, the Federal Power Commission took the case under advisement. An immediate decision is not expected, and some think it may be a matter of weeks before the commission announces its conclusions. Such uniform opposition to the granting of the Girand license came from all of the states in the Colorado River basin that an unusual amount of political courage would be required to order the license issued. On the other hand, the attorneys for Mr. Girand contended that their client had complied exactly with the water-power act. Under those conditions, they argued, a license may not be withheld legally.

On the eve of the hearing the United States Geological Survey issued a report by E. C. Larue, one of its engineers, recommending a dam which would flood out the proposed dam at Diamond Creek. Before the hearing was ended the State of Arizona formally filed an application for federal rights covering such a project.

Opposing Contentions

The representatives of Mr. Girand contended that the rights of all the states could be protected by including conditions in the license. It was argued that any protection granted by the Colorado River compact would thus be made to apply to this development. L. Ward Bannister, representing Colorado, declared that any such waivers could not bind the commission or the applicant and that they left the third parties to the agreement without recourse in law. He urged that no action be taken until the compact has been ratified by all of the states. He predicted that Arizona would ratify it at the next session of its Legislature. The representative of Governor Hunt of Arizona opposed any private development on the river in Arizona on the ground that the state is preparing to undertake it. The Attorney-General of Arizona contended that Mr. Girand had forfeited his state rights. This Mr. Girand denies. It is his position that he began work on the project within the limits of his state permit, but was stopped by a federal injunction issued at the request of the Federal Power Commission.

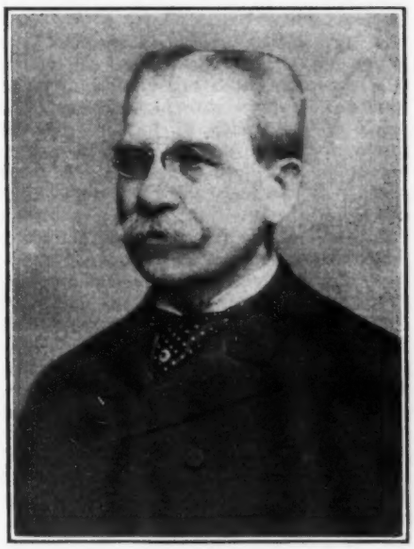
George L. Maxwell opposed the Girand license on the ground that it will interfere with the high-line gravity canal intended to furnish water for irrigation purposes. The contention on behalf of California, among other things, was that the Girand development would skim the cream from the market for power and thereby would delay the construction of the Boulder Canyon Dam for an indefinite period.

Representatives of the Imperial Valley argued that the development at Diamond Creek would increase the low-water flow of the river and give Mexico a claim on a larger amount of water. Governor Nellie T. Ross of Wyoming was firm in her insistence that no rights be granted until the compact is signed. Wyoming is high now, she said, and can take no chances on being high and dry too. Former Representative Frank Mondell of Wyoming contended that Congress in authorizing the Colorado River commission had taken the river out of the hands of the Federal Power Commission. He argued that the commission has no authority to act until the compact is accepted or rejected.

John I. Beggs Dies

Successful Career of President of Milwaukee Electric Utility Ends at Seventy-eight

JOHN I. BEGGS, president of the Milwaukee Electric Railway & Light Company and prominent as an organizer and financier of electric utilities since 1883, died in Milwaukee on Saturday, October 17, at the age of seventy-eight. Mr. Beggs' first connection with the electrical industry was with the Harrisburg (Pa.) Electric Light Company, one of the earliest Edison licensees. In 1886 he was called to the post of vice-president and general manager of the Edison Electric Illuminating Company of New York, the largest of the early central stations. In 1890 the Edison General Electric Company was organized, and Mr. Beggs was appointed manager of the central district with headquarters in Chicago. Here he organized the traction system and later operated it at a profit.



JOHN I. BEGGS

After three years in Chicago Mr. Beggs joined the General Electric Company in New York, soon removing, however, to Cincinnati, where he acted in an advisory capacity for the Cincinnati Edison Company. A little later the Milwaukee Electric Railway & Light Company went into bankruptcy, and he served that company also. In 1896, the company in the meantime having been restored to its stockholders, he was elected its president and general manager. The year 1902 saw Mr. Beggs directing the Cincinnati, Milwaukee and St. Louis properties of the North American Company. After a time he ceased to be so active in this work and became interested in various Wisconsin companies, directing the operation of the Wisconsin Traction, Light, Heat & Power Company and eventually acquiring control of the Southern Wisconsin Power Company and the Wisconsin River Power Company, afterward sold to the Insull interests. In 1911 he retired from the presidency of the Milwaukee Electric Railway & Light Company and became president and general manager of the St. Louis Car Company; but, after nine years, he was in June, 1920, again elected president of the Milwaukee utility company, retaining that post until his death.

Mr. Beggs' success as an executive and operator of public service companies brought him many encomiums. He has been described as "an ideal executive of a great company—an engineer, an administrator, an accountant and a financier." In 1906 he was elected president of the American Electric Railway Association. He was an associate member of the American Institute of Electrical Engineers.

Expansion Plans of Virginia Railway & Power

Besides the absorption of the Williamsburg (Va.) Power Company, as announced last week, plans are on foot for the immediate merger of other Virginia companies as well with the Virginia Railway & Power Company, the name of which will, according to President Luke C. Bradley, be changed to the Virginia Electric & Power Company. Among the companies named are the Spotsylvania Power Company of Fredericksburg, the Roanoke Rapids Power Company of Roanoke Rapids, N. C., and the Roanoke River Development Company of Weldon, N. C. The merger is expected to take effect on November 1, after confirmation by stockholders. Mr. Bradley declared that the Virginia Railway & Power Company was in no wise interested in the recent merger of the Halifax Power Company and the Emporia Hydro-Electric Power Company. At this time the Virginia Railway & Power Company is interested in power development in tidewater Virginia and a short distance down in North Carolina only. Its intention, as explained by the president, is to link together the power systems at Fredericksburg, Richmond, Petersburg, Williamsburg, Suffolk, Portsmouth, Norfolk and the two North Carolina communities into one interconnected system. The Virginia Railway & Power Company, Mr. Bradley asserted, is not interested in the western part of Virginia and anticipates no rivalry from the Appalachian Power Company, whose headquarters are at Bluefield, W. Va.

Kansas Public Service Association Meets

On the program for the twenty-eighth annual convention of the Kansas Public Service Association, held at Topeka on Thursday and Friday of this week, were addresses by S. B. Irelan, president Middle West Division, N. E. L. A., on "How the Local Company May Profit by Association Activities"; by Frank H. Winkley, General Electric Company, on "Street and Highway Lighting"; by F. D. Farrell, president Kansas State Agricultural College, on "Electricity and the Farmer's Wife"; by Miss Helen Grice, Abilene, on "How Women Employees Can Assist in the Sale of Public Service Securities"; by M. M. Boggess, General Electric Company, on "Power-Factor Correction," and by State Superintendent of Public Instruction J. W. Miley, Prof. George Shaad of the University of Kansas, C. D. SeCheverell, general manager Central Power Company, Grand Island, Neb., and Managing Director Aylesworth of the N. E. L. A.

Trips of inspection to the new Tecumseh plant of the Kansas Power & Light Company, 6 miles from Topeka, were made. Several directors of public utility information bureaus in other states were present. Prof. H. B. Walker presented a report on rural electrification. There was a luncheon conference on Friday, and in the evening of that day the annual banquet was held, Colonel R. H. Timmons acting as toastmaster and Governor Paulen being among the expected speakers. Some notes on the convention will be printed in a later issue.

Colorado Springs Adopts Odd Means to Finance Purchase

After taking over all of the electric properties of the Colorado Springs Light, Heat & Power Company on June 1, the city of Colorado Springs, through action of its City Council, acquired the gas holdings of the company, which had been reorganized as the Colorado Springs Gas Company, and assumed operation of the business of the latter on October 1. The price paid is understood to have been $685,000, which fund will be financed in entirety by so-called income warrants, a scheme arranged by James H. Causey, prominent Denver banker and owner of various small utility companies in the mountain region. Mr. Causey has purchased these warrants, thus providing the necessary funds for the city to pay the gas company, which was formed by a bondholders' protective committee representing the United Gas & Electric Company, the holding company formerly holding both franchises in the city.

Inasmuch as the income warrants do not serve as a lien or mortgage against the physical property of the gas plant and have made possible the purchase of the property without approval by the taxpayers of Colorado Springs, Western utility men look upon the financial scheme as a pernicious instrumentality which might be employed in taking over other private utilities without the usual legal requirements and issuance of bonds.

The city of Colorado Springs has completed the distribution line from the new steam generating plant. Officials report that the electric business of the municipality during the month of September netted $28,000.

New York Electrical Show

Complete Exhibits of Appliances Attract Keen Attention of Public—Educational Displays

THE eighteenth annual Electrical and Industrial Exposition of New York, held at Grand Central Palace, October 14-24, has again proved to be a "Mecca" for manufacturers of electrical labor-saving appliances. The exhibits are particularly complete and contain many new devices as well as those with which the public has long been familiar. Three floors of the Grand Central Palace are occupied by the display. Much space and attention have been given to electrical refrigerators by the manufacturers, and it is evident that the public has a keen interest in the subject of electric refrigeration.

The value of educational exhibits in creating better public relations is seen in the display of the underground conduit system in New York streets, the government exhibits showing the various applications of electricity in the army, navy and lighthouse divisions, the iron-manufacturing exhibit and the various displays showing the applications of electricity to industry, as in garment manufacture, woodworking, etc. The merchandising methods used at this exposition have been noticeably on a high plane and have tended to create a desire on the part of the public to use electrical appliances regardless of any particular make on display.

Arthur Williams, vice-president of the New York Edison Company and president of the Electrical Show Company, in commenting on the exposition, remarked on the noticeable improvement in the quality of attendance and on the stronger interest displayed by the American housewife, who, he said, seems determined to relieve herself from the slavery of household drudgery by the increased application of electrical labor-saving appliances. Commenting upon electrical development in France, as observed by him during his visit this summer, Mr. Williams pointed out that the amount of electrical energy used throughout the entire French nation was approximately 6,000,000,000 kw.-hr. in 1924, while the combined energy consumption in Greater New York alone for the same period was 5,000,000,000, kw.-hr. Mr. Williams called attention to the visit to America of the French electrical delegates and said that it is particularly fortunate that they are having an especial opportunity for the study and exchange of information. The value of the exposition to the manufacturers exhibiting their wares was also stressed by Mr. Williams since it presents an occasion for the interchange of information and ideas so that competitors may see any shortcomings and thus take steps to make the necessary improvements.

Trade Commission Hearing Radio Monopoly Charges

What bids fair to be an extended hearing into the charges of monopoly in the radio industry was begun in New York on October 20 by the Federal Trade Commission. There are eight defendants—the General Electric Company, the American Telephone & Telegraph Company, the Western Electric Company, the Westinghouse Electric & Manufacturing Company, the International Radio Telegraph Company, the United Fruit Company, the Wireless Specialty Apparatus Company and the Radio Corporation of America.

The complaint charges that the respondents have combined and conspired to restrain competition and create a monopoly in the manufacture, purchase and sale of radio devices and in domestic and transoceanic radio communication and broadcasting. To accomplish this end, it is charged, they have acquired control of the patents covering all devices and apparatus used in radio work, pooling these rights and allotting their exclusive use among themselves.

The defendants are represented by an array of distinguished counsel. Speaking with their concurrence, John P. Cotton, who represents the Radio Corporation of America, protested against the assumption of jurisdiction by the Federal Trade Commission. The acts complained of, he said, at most constitute a purely voluntary combination of supplementary and non-competitive units for the purpose of creating an industry which could not otherwise have been created. He said the acts of the respondents cited in the complaint were not only approved by other executive departments of the federal government, but were entered into with their full co-operation.

An interesting piece of testimony on the second day was given by Percy M. Haight, secretary-treasurer of the International General Electric Company, to the effect that the company knows nothing of the present state of the Russian General Electric Company, of whose shares it owned 16.66 per cent. This company had a plant at Moscow and had Russian officers. Apparently the International General Electric has ceased to concern itself about the fate of its former Russian ally.

General Electric Gets Basic Vacuum-Tube Patent

Twelve years of Patent Office litigation over the basic patent rights to the modern vacuum tube, used extensively in radio, X-ray and similar work, resulted last week in the award of the patent to the General Electric Company. The type of tube involved in the litigation was invented in 1912 by Dr. Irving Langmuir, assistant director of the General Electric research laboratory. During the war the legal battle was suspended because of the necessity of war work being done by the litigants, but it began again after the armistice. It is estimated that there are more than ten million tubes embodying the invention now in operation in the United States.

"Public Power Conference" at Lansing Slimly Attended

A "public power conference" held at Lansing, Mich., on October 13 and 14 under the auspices of the Public Ownership League of America failed to attract more than a handful of hearers to most of its sessions, although two hundred students gathered at the Michigan State College to listen to an address specially directed to them by Secretary Carl D. Thompson of the league, who was in charge of the conference. Speeches were made by Willis J. Spaulding, president of the league, who is manager of the Springfield (Ill.) municipal light and power plant, and by Oscar E. Bulkeley, general superintendent of the Lansing municipal plant, both of whom described the accomplishments of municipal ownership as they viewed them; by Dean G. W. Bissell of the engineering department of the college, who discussed rural service; by Miss Jennie Buell of the Michigan State Grange and by other representatives of farmers and labor bodies. A resolution favoring special assessment districts for the financing of rural power systems in Michigan was passed.

Well-Rounded Program for Southeastern N. E. L. A.

Chattanooga's Memorial Auditorium will furnish the setting for the thirteenth annual convention of the Southeastern Division of the National Electric Light Association at the Tennessee city named on Thursday and Friday, October 29 and 30. Amusement and sightseeing will be amply provided. On Thursday evening a banquet will be held at the Chattanooga Golf and Country Club, P. S. Arkwright being toastmaster. The tentative business program follows:

THURSDAY, OCTOBER 29

Morning.—General session: Address of welcome, Mayor Richard S. Hardy; president's address, Thomas W. Martin; addresses, James E. Davidson, president N. E. L. A.; Harvey S. Hannah, chairman Railroad and Public Utilities Commission of Tennessee; Miss Elizabeth Lee, national chairman women's committee, N. E. L. A.; M. H. Aylesworth, managing director N. E. L. A.

Afternoon. — Public Relations Section: "Utility Information Committees," F. E. Boney, Raleigh, N. C.; "Women's Place in Creating Good Will," Mrs. Jane Pratt, Birmingham; "The National Association Publicity Bureau," George F. Oxley, publicity director N. E. L. A.; address, R. M. Harding, Columbus, Ga.

Technical Section: Review of technical progress in electrical industry, Chairman H. L. Wills; round-table discussion of meter problems, directed by S. A. Fletcher, Birmingham, and opened by A. J. McKenzie, Chattanooga; round-table discussion of rural-line construction, directed by N. T. Kinsly, Nashville; "Primary Distribution Substations," L. M. Smith, Birmingham; "Automatic Substations," J. A. Rankin, Atlanta.

Commercial Section: "Industrial Heating," Wirt S. Scott, chairman industrial heating committee, N. E. L. A.; "Industrial Lighting," M. H. Horner, General Electric Company; "Women in Sales Work," A. B. Collins, Alabama Power Company; "Model Electric Home," H. M. Camp, Tennessee Electric Power Company; "Commercial Activities," E. W. Lloyd, chairman National Commercial Section, N. E. L. A.

Accounting Section: "Determining Actual Cash Value of Public Utility Properties for Assessment Purposes," McGregor Smith, Railroad and Public Utilities Commission of Tennessee; "Errors—Their Correction and Prevention," J. H. Roberts, Chicago.

Evening.—Banquet: address, M. S. Sloan, chairman Public Relations Section, N. E. L. A.

FRIDAY, OCTOBER 30

Morning. — Public Relations Section; "Heard and Seen," F. Woodruff, Atlanta; "Advertising," J. C. Costello, Chattanooga; "Executive Co-operation," M. H. Aylesworth; address, J. S. Pevear, president Birmingham Electric Company; "Customer Ownership," J. J. Brennen, Memphis.

Technical Section: "Construction and Operating Features of Hale's Bar Steam Plant," S. A. Longley, Chattanooga; "Hydraulic Experiments of Alabama Power Company" (illustrated), D. C. Thurlow and Ireal Winter, Birmingham; "Maintenance of Steam Plants Operated at High Plant Factor," A. T. Hutchins and M. F. Neeson, Birmingham; "New Features in Alternating-Current Generator Design," H. G. Reist, General Electric Company, Schenectady; discussion of prime-mover problems directed by J. A. Langley, Chattanooga.

Commercial Section: Address, A. K. Baylor; "New Types of Incandescent Lamps," O. P. Anderson, Harrison, N. J.; address, W. R. Herstein, New Orleans; "Appliance Sales and Service," H. W. Cameron, Nashville; "Signs and Spectacular Lighting," representative of Federal Electric Company, Chicago.

Accounting Section: Address, J. M. Billing, Athens, Ga.; "Frauds in Business," Cameron Black, Atlanta; "Bookless Bookkeeping," R. McCrorey, Atlanta.

Afternoon.—General Session: Addresses, Major Harold Fisk, Chattanooga; B. C. Cobb, New York; Colonel William Kelly, chief engineer N. E. L. A.; "Good Helpers and Bad," M. O. Leighton; "The Economic Aspects of Superpower," Dr. Joseph H. Pratt, Asheville, N. C.

Increase in Niagara Diversion Authorized

Federal Power Commission Grants Niagara Falls Power Company Addition of 225 Sec.-Ft.—Feather River Project Licensed—Preliminary Permits Issued

AN AMENDMENT to the license of the Niagara Falls Power Company which will allow it to increase by 225 cu.ft. per second the amount of water it is diverting from the Niagara River has been authorized by the Federal Power Commission. The amendment, however, is conditioned upon the acceptance of the license recently authorized for the Newfane Mill Owners' Association for the diversion of water from the New York Barge Canal into Eighteen-Mile Creek. One condition of the license is that the Niagara Falls company continue to measure the amount of water spilled into Eighteen-Mile Creek below the locks at Lockport. Another condition, intended to guard against unauthorized diversions into Eighteen-Mile Creek, requires that the 225 sec.-ft. may be reduced from time to time by the amount by which, in the opinion of the commission, the waters spilled into Eighteen-Mile Creek exceed the reasonable requirements for the navigation of the canal. A third condition specifies that the license is not to be construed as excusing the Niagara Falls Power Company from paying proper state charges.

JOINT LICENSE FOR FEATHER RIVER

The commission has authorized the issuance of a joint license to the Feather River Power Company and the Great Western Power Company covering a large project on tributaries of the North Fork of Feather River in Plumas County, Cal. The license, however, is to be contingent on the securing of the necessary state rights and upon the commission being given the right to have access to all books and records of the companies so that nothing in excess of the actual legitimate cost of the project may be entered upon the project account. It is proposed to erect a dam 106 ft. high in Bucks Creek and create a reservoir with 103,000 acre-feet of storage. The water is to be conducted to a power house on the North Fork of the Feather River, where equipment sufficient to generate 60,000 hp. will be installed. The Feather River Power Company has a tentative contract with the Great Western Power Company for the sale of all electrical energy generated and for the complete transfer of the project to the Great Western Power Company at the end of thirty-five years.

The proposed development of the West Florida Company of Tallahassee on the Ocklocknee River near Midway comes within the purview of the water-power act, the Chief of Engineers has found, and the commission has notified the company that it will have to secure federal rights before undertaking the development. The commission has approved a transfer of power rights from the Ocklawaha (Fla.) Reclamation Farms to the Ocklawaha Power Company.

The commission has approved the transfer to the Southern Ohio Public Service Company of the rights of the Columbus, Newark & Zanesville Electric Railway Company to the constructed project at Dam No. 10 in the Muskingum River.

In the license prepared for the signature of the Nevada Irrigation District, covering the rights which the commission has awarded to that interest, the Pacific Gas & Electric Company is made a co-licensee to the extent of its contract with the irrigation district. That contract provides for the power company to make payment to the district in proportion to the amount of power it is able to develop with district water. Another condition of the license is that the commission reserves jurisdiction over all water of the Middle Yuba which is not actually used by the licensee.

PERMITS AUTHORIZED

Preliminary permits have been authorized by the commission as follows:

To the Oregon-California Hydro-Electric Company of Portland, Ore., a preliminary permit for two years for a power project on Zigzag, Salmon and Sandy Rivers, in Clackamas County, Ore. The project consists of diversion dams, a storage dam, conduits and a power house. The estimated power capacity of the project is 23,000 hp. and the installed capacity 70,000 hp.

To the Appleton Land, Water & Power Company of Los Angeles, a preliminary permit for two years for a proposed power development within the Santa Barbara National Forest on Deep Creek, a tributary of Mohave River, in San Bernardino County, Cal. The project consists of a storage dam designed to create about 1,000 acre-feet of storage, with about 3 miles of water conduit, and a power house hav-

ing an approximate installed capacity of 7,900 hp. The power generated will be used primarily for irrigation pumping.

To H. W. Meredith of Poplar Bluff, Mo., a preliminary permit for three years covering a proposed project in the Black River in Wayne and Reynolds Counties, Mo., abo t 3 miles below the town of Piedmont. The project will consist of a dam about 100 ft. high in the river, with appurtenant water conduits and a power house.

To Arthur Moa of Ketchikan, Alaska, a preliminary permit for two years for a power project on Lower Fish Creek, a tributary of Salmon River, about 6 miles from Hyder, Alaska, and within the Tongass National Forest. The project will consist of a diversion dam, a conduit, a power house with a power capacity of approximately 200 hp. and a transmission line, to be used in the working of mining claims and for water supply for the town of Hyder.

To the Northwest Power & Light Company of San Francisco, a preliminary permit for two years for a power development in the Elwha River, Clallam County, Wash. The project will consist of a concrete dam with an adjacent power house developing about 160 ft. in head in Glines Canyon. The reservoir formed by the dam will impound about 15,000 acre-feet of water. The power capacity of the project is about 7,000 hp.

To Clark E. Jacoby and Eugene L. Williams, operating as the Central Missouri Power & Water Company, a preliminary permit to expire June 26, 1926, for a proposed project in the Gasconade River, in Pulaski and Phelps Counties, Mo. The project will consist of a concrete dam about 100 ft. high and a power house to be built 1½ miles above the town of Arlington. The power capacity of the site is approximately 15,000 hp. The proposed installed capacity will be 45,000 hp.

PERMITS EXTENDED

Extensions of preliminary permits have been made as follows:

To the Snow Mountain Water & Power Company, for the completion of its project on the South Fork of Eel River, Lake County, Cal. More time will be required to complete the power house at Scott Dam, to install additional equipment at the Potter Valley power house and to complete the transmission system. It has also been decided to raise the dam. The commission has divided the project into two parts, one to be completed by January 1, 1928, and the other by July 1, 1929.

To the Yosemite Power Company of San Francisco, for a development on the Tuolumne River and its Middle and South Forks, until August 20, 1926, to grant additional time to arrange for the sale of the power.

To the Home Power Company of Skagway, Alaska, until July 17, 1926.

To John L. Fish of Lakeside, Ariz., for a project on Salt River, until March 6, 1927.

ASK PERMITS OR LICENSES

The following applications are before the commission:

By J. B. Knight of Eureka, Cal., for a preliminary permit covering a proposed 5,000-hp. development on New River in the Trinity National Forest near Eureka. He proposes to construct a dam 50 ft. high and 250 ft. long, a conduit 12 miles long and a power house near the mouth of New River.

By the Liberty-Montana Mines, Caldwell, Mont., for a license covering a 300-hp. project on South Boulder Creek near Caldwell. It is proposed to construct a dam 15 ft. high and 150 ft. long. The water will be carried through a 20-in. conduit 4,400 ft. to the power house. A transmission line 1,151 ft. long will carry the power to the mine and the mill of the applicant.

By George B. McClary of Chicago, for a preliminary permit on Rock River in Illinois. He proposes to erect three dams, one near Latham Park, one near Byron and one near Grand Detour.

By the Pacific Power & Light Company of Portland, Ore., for a license covering a transmission line 25 miles long on public land in Denton County, Wash.

By the Northern Light, Heat & Power Company of Milwaukee, for a license covering a transmission line 24 miles long from Caldron Falls to Soperton, Wis.

By J. J. Williams and others of Codele, Ga., for a preliminary permit covering a project on Flint River, at a point not far from Warwick, Ga. A head of 30 ft. can be obtained at that point, where it is proposed to install four turbines of 3,500 hp. each.

Briefer News

More Changes in Texas.—The Texas Power & Light Company of Dallas has purchased the plant of the Lampasas Light & Power Company, which will be connected to the power transmission system of the company. The Texas Central Power Company is constructing an electric power station at Pleasanton. This plant and other improvements which the company is making there will cost $150,000.

Southside Virginia Power Company Comes Into Being.—The Southside Virginia Power Company—the new name of the merged Halifax Power Company and Emporia Hydro-Electric Power Company, with authorized capital stock of $1,000,000 to $5,000,000—has been chartered by the Virginia State Corporation Commission. Colonel Ira Vaughn, formerly of Philadelphia and now of Halifax, is president.

Insull System Takes Over Small Wisconsin Property.—The Fairwater Electric Power & Light Company, which has supplied electric service in Fairwater and in the neighboring towns of Brandon and Alto with power purchased from the Wisconsin Power & Light Company, has been taken over by the Insull interests. The property involved includes a water-power plant and distribution system at Fairwater and transmission lines to Brandon and Alto, together with the distribution systems in each village.

Another Cut in Potomac Edison Rates Possible.—Reports filed with the Public Utilities Commission of the District of Columbia by the Potomac Electric Power Company are said to show that the company earned more than 7⅛ per cent on the valuation of $32,500,000 in the first eight months of 1925. Under the terms of the agreement arrived at last January, if the company earns above the percentage named for the twelvemonth, only half the excess amount will go to it, the other half being used as a basis for a further rate reduction.

New 40-Mile Power Line in Virginia Completed.—The new 110,000-volt steel-tower transmission line from Ronceverte, Va., by way of White Sulphur Springs, W. Va., and Covington, to Clifton Forge, Va., has been completed for the Virginia Western Power Company and is in operation. The line is 40 miles long. There are 239 steel towers, together with a new substation at each end of the line. It is the second link in the transmission system to be built from Ronceverte to Charlottesville, a distance of 135 miles. Last year the section from Charlottesville to Staunton was completed.

New Englanders Visit Montaup.—Open house was kept last week by the Montaup Electric Company at its new steam plant at Somerset, Mass., recently placed in operation to serve the Fall River Electric Light Company, the Edison Electric Illuminating Company of Brockton and the Blackstone Valley Gas & Electric Company. On Wednesday the New England System Operators' Club inspected the plant and was addressed by Joseph Pope, consulting engineer Stone & Webster, Inc., Boston, on "The Heat Balance at Montaup," and on Saturday a joint excursion to the plant was held by the Boston sections of the A. I. E. E. and A. S. M. E.

Electric Welding Replaces Rivets in Canton (Ohio) Building.—Electric welding has been adopted, to the exclusion of rivets, for uniting the structural-steel members of a two-story building being erected for the Peerless Auto Sales Company, Canton, Ohio. The steel has been fabricated by the Morgan Engineering Company, Alliance, Ohio, and is being erected by it after making tests for reliability and safety which met the approval of the architects, building inspectors and owners. The welding done in the shops was handled by three operators working with Lincoln Electric Company machines, the field work by one such machine and a single operator. This is believed to be the first instance of the erection of a steel building entirely without rivets.

One Thousand Men at Work at Chute à Caron.—No time is being lost in carrying out the development work in the Lake St. John district of the Province of Quebec, where the large Davis-Duke plant at Chute à Caron is being erected. More than a thousand men are at work on the site at present. A model town, which will ultimately bear the name of Arvida, is being erected and is expected to acquire in time a population of 30,000. According to E. S. Fiskis, vice-president of the Aluminum Company of America, the new plant will be completed at the end of 1926. Transmission wires from the Grand Décharge will be installed within the next three months for temporary use.

Southern Power Company Orders 100,000 Hp. in Steam Turbines for Coming Plant.—Officials of the Southern Power Company announced last week the award to the General Electric Company of a contract for two 50,000-hp. steam turbines for a steam-electric plant to be built, in accordance with a recent announcement of the Southern Power Company, to safeguard that company against recurrence of the drought of this year. The new plant will be rated at 100,000 hp., instead of 80,000 hp., as was originally planned, and will therefore be twice as large as the one at Mount Holly. The site of the new plant has not yet been announced, but it is understood that it will be on the Catawba River.

Snow Mountain Company in California Plans Expansion.—Plans of the Snow Mountain Water & Power Company to erect, at a cost of approximately $3,200,000, two new hydro-electric power plants, one in Coyote Valley, in Mendocino County, and the other at Scott's Dam, in Lake County, with a total capacity of 43,226 hp., were revealed when the company applied to the State Department of Public Works for a permit to take 400 cu.ft. of water a

second from the South Fork of the Eel River for the generation of power at three plants. The company, which serves Potter Valley and Ukiah, now has a plant on Gold Creek, a tributary of the Russian River. After passing through this power house and the two proposed plants, the water applied for will be emptied into the Russian River. The proposed plants are said to be part of a seven-million-dollar development program.

North American May Take Over Central Mississippi Valley Properties.—It is reported in St. Louis financial circles that the North American Company, which recently acquired control of the Missippi River Power Company for the Union Electric Light & Power Company, is seeking to acquire control of the Central Mississippi Valley Electric Company properties, managed by Stone & Webster of Boston. These holdings include electric lighting plants in Keokuk and Fort Madison, Iowa, and Dallas City, Warsaw and Hamilton, Ill., besides electric railway and gas properties.

Hoover Sees No Funds Forthcoming for Development on Colorado.—No federal funds are likely to be voted at the coming session of Congress for any project on the Colorado River, Secretary of Commerce Hoover predicts. The East, at best, he says, is not eager to see money poured into Western ventures. If there is disagreement in the West, a valid excuse at once is afforded other sections to defer action or vote down the proposal. Secretary Hoover obviously was referring to the Swing-Johnson bill, which provides for the construction of the Boulder Dam and the all-American canal.

Twenty-five Missouri Cities Discontinue Municipal Ownership.—La Belle, which recently sold its electric generating and distribution plants to the Missouri Light Company, was the twenty-fifth place in Missouri to change from municipal ownership of electric plants to private ownership since January 1, 1922. St. Joseph, Armstrong, Centralia, Glasgow, Linneus, Nettleton, Windsor, Gallatin and Higginsville still distribute energy but have ceased to generate it. Rolla, Baring, Breckenridge, Callao, Clarence, Kidder, Cabool, Sweet Springs, Troy, Blackwater, Worth, Chilhowee, Bolivar, La Belle, Alma and Norborne no longer either distribute or generate it. In addition, the city of Clinton, Mo., by a vote of two to one on October 14 decided to sell its municipal water and light plant to the Missouri Power Company, a subsidiary of the Studebaker Corporation.

Dispute Over Oswego (N. Y.) Territory.—The General Development Corporation of Oswego, N. Y., is asking the Public Service Commission of the state to approve a franchise allowing it to distribute electricity in Oswego, and the application is opposed by the People's Gas & Electric Company of that city. The company first named, which is controlled by the Carlisle interests, maintains that there is a demand for power in Oswego that cannot be supplied by the People's Gas & Electric Company. The General Development Corporation has in progress a power development which is scheduled for completion about August 1, 1926. This development, according to Vice-president E. E. Whitney, will have 9,000 hp. capacity at first with an ultimate capacity of 18,000 hp. The system would be tied in with the Northern New York Utilities and the Niagara, Lockport & Ontario Power Company. The commission adjourned a hearing on the application until November 17.

Good Performance at Queenston Plant.—A statement by the Ontario Hydro-Electric Power Commission says that recent tests made of the seventh and eighth generators installed at the commission's power house at Queenston show a maximum generating capacity for each unit over a short period of no less than 70,000 hp. The first units are rated for a normal capacity of only 50,000 hp. The increased generating capacity of the units is due to improvements which give greater efficiency and to a slight increase in the size of the machines. There has been a steady increase in the capacity of the successive units, the fourth and fifth having about 60,000-hp. capacity. At the present time the Hydro cannot operate any more units at Queenston without shutting down one or more generators at Niagara Falls, where only half as much electricity can be produced from a given quantity of water.

Los Angeles Seeks Right to Colorado River Waters.—Applications have been filed by the Los Angeles Municipal Bureau of Power and Light with the California and Arizona water commissions and the Federal Power Commission for permission to divert the waters of the Colorado River near the town of Parker, Ariz. In case of favorable action by the various commissions it is planned to construct a dam at this site which would make available approximately 1,500,000 acre-feet of water for the city of Los Angeles and would develop at least 100,000 hp. of electrical energy, in addition to acting as a secondary water-control project in conjunction with the proposed Boulder Canyon dam.

Marinette County (Wis.) Court Sustains North American Company's Plans.—A decision rendered last week by the Marinette County (Wis.) Circuit Court in the action brought by the Wisconsin Public Service Corporation to restrain the Wisconsin Gas & Electric Company, a North American subsidiary, from building a line from Green Bay to Amberg follows the lines of the decision recently handed down by the Brown and Oconto County courts, reported in the ELECTRICAL WORLD for October 3 (page 709). The Marinette court holds that the objecting company's rights are amply protected by law and sees no reason why the utility company and the paper-manufacturing company should not occupy the same poles.

New Edition of National Code Ready.—The 1925 edition of the National Electrical Code has been released by the National Board of Fire Underwriters. The actual date when it supersedes the 1923 edition can be determined upon inquiry of the authority by whom inspections are made in each respective locality. The electrical committee of the National Fire Protection Association will meet in February, 1926, to consider proposed amendments to the 1925 edition of the code in accordance with the program announced when the committee was so enlarged that it qualified as a section under the procedure of the American Engineering Standards Committee. Recommendations for additions or changes received before November 1 can be routed to appropriate article committees for consideration and report to the February meeting. The need for a 1926 edition of the code, or a supplement to the 1925 issue, will be determined at the February meeting.

Superintendent Ross of Seattle Attacks "Power Trust."—Attacking a city manager plan for the city of Seattle, proposed by the Municipal League, J. D. Ross, superintendent of lighting, urges that the city "take municipal utilities out of politics for good by placing them, through a city charter amendment, under an elected board of five commissioners serving without pay." Mr. Ross declares himself "satisfied that the power trust prevailed in this so-called manager plan" and says that if the plan were put into effect, it would destroy the identity of the lighting department. Mr. Ross' statement has brought a warm retort from the president of the league, who declares that "no one directly or indirectly connected with the power company was ever consulted or had the slightest hand in preparing the plan" and that "experience with the city manager plan shows that, instead of ruining municipal utilities, the plan fosters, improves and economizes them.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see ELECTRICAL WORLD, July 4, page 50.]

Southeastern Geographic Division, N. E. L. A.—Chattanooga, Tenn., Oct. 29-30. E. T. O'Connell, Alabama Power Co., Birmingham.

American Engineering Council—Administrative Board, Columbus, Ohio, Oct. 29-30. L. W. Wallace, 26 Jackson Place, Washington, D. C.

Public Utilities Association of West Virginia—Kanawha Hotel, Charleston, W. Va., Oct. 30-31. A. Bliss McCrum, 514 Charleston National Bank Bldg., Charleston, W. Va.

Associated Manufacturers of Electrical Supplies—New York, Nov. 9-13. F. Nicholas, 30 East 42d St., New York.

Electrical Supply Jobbers' Association—Hotel Statler, Buffalo, Nov. 16-20. Franklin Overbagh, 411 South Clinton St., Chicago.

Electrical Credit Association, Central Division—Hotel LaSalle, Chicago, Nov. 19 and 20. F. P. Vose, 1008 Marquette Bldg., Chicago.

American Society of Mechanical Engineers—New York City, Nov. 30-Dec. 4. C. W. Rice, 29 West 39th St., New York.

American Society of Agricultural Engineers, North Atlantic Section—Schenectady, N. Y., Dec. 10-12. Raymond Olney, St. Joseph, Mich.

Men of the Industry

A. Prager New President of Rocky Mountain Division

Arthur Prager, who was elected president of the Rocky Mountain Division of the National Electric Light Association at the recent Glenwood Springs convention, has been identified with the public utility industry since 1907 and during the greater part of that period has been affiliated with the subsidiaries of the Federal Light & Traction Company. For a number of years he was connected with the Trinidad Electric Transmission, Railway & Gas Company and later with the Deming (N. M.) Ice & Electric Company. Subsequently he became auditor of the properties at Albuquerque, N. M., where he remained for three years before being promoted to the post of assistant treasurer of the Springfield (Mo.) Gas & Electric Company and the Springfield Traction Company. Having resigned to enter the United States Army, Mr. Prager, upon the completion of his military service, was appointed manager of the Albuquerque Gas & Electric Company. He has been very active in the New Mexico Electrical Association as well as in the national association.

ARTHUR PRAGER

Taylor C. Harvey, formerly connected with the commercial department of the Kansas Electric Power Company, has been transferred to the Michigan Electric Power Company, Bad Axe, Mich., where he will assume the duties of commercial manager.

C. C. Hellmers, formerly manager of the Maryville (Mo.) Electric Light & Power Company, has become manager of the securities department of the United Power & Light Company at Lincoln, Neb. The United controls the Maryville property.

Fremont L. Lovett, manager of the Montpelier & Barre (Vt.) Light & Power Company, was presented with the Charles H. Tenney award for meritorious service at the recent convention of the Tenney Service Association at Swampscott, Mass. The award, a bronze medal, was conferred by Col. Charles H. Tenney in recognition of Mr. Lovett's courage and judgment displayed in reviving a citizen of his company's territory from drowning and in applying the prone-pressure method of resuscitation in the face of extreme opposition.

C. E. Fahrney, who resigned as general manager of the Northern States Power Company of Ottumwa, Iowa, when that concern was taken over by the Iowa Southern Utilities, will on November 1 become general manager of an H. M. Byllesby group of utilities serving fourteen towns with headquarters at Ardmore, Okla.

James E. Wilson has joined the sales staff of the Acme Electric Heating Company, with headquarters at the factory, 1217 Washington Street, Boston. Mr. Wilson was formerly secretary of the Massachusetts Association of Electrical Contractor-Dealers and is well known in the supply jobbing field.

New Officers for Municipal Gas Company of Albany

At the annual meeting last week of the stockholders of the Municipal Gas Company of Albany, N. Y., which has an electric department, **Robert Olcott,** president of the Mechanics and Farmers' Bank, Albany, was elected president, succeeding Nicholas F. Brady of New York, and **William G. Furlong,** who has served as secretary and treasurer for the last twelve years, was elected vice-president and general manager in place of Carl F. Graf, resigned. **Thomas H. Powers,** who has been connected with the Municipal Gas Company for thirty years, was made treasurer to succeed Mr. Furlong. **Neile F. Towner** was named secretary and will continue to serve as counsel. **Edward B. Shevlin,** for many years chief clerk, was chosen assistant secretary. **George Penney,** general bookkeeper, was named assistant treasurer. Charles F. Brewer, chairman of the board of directors of the Mohawk-Hudson Power Company; Charles S. Ruffner, president of the same company, and Cornell S. Hawley of the Consolidated Car Heating Company were elected directors. Directors re-elected include John A. Delehanty, Charles Gibson, John S. McEwan, Neile F. Towner, E. Palmer Gavit and Robert Olcott.

D. K. Chadbourne Made Westinghouse International Manager

As reported in the ELECTRICAL WORLD for October 17, Dean K. Chadbourne has been appointed general manager of the Westinghouse Electric International Company to succeed E. D. Kilburn, who was recently elected vice-president of the Westinghouse Electric & Manufacturing Company. Mr. Chadbourne was born in Elmira, N. Y., and was graduated from Purdue University in 1906 with the degree of bachelor of science in electrical engineering. He was for six years connected with the Chicago office of the Allis-Chalmers Company and then became district manager of the George Cutter Company of South Bend, Ind. In 1920 he joined the Westinghouse Electric International Company and was made manager of the Far Eastern department.

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DEAN K. CHADBOURNE

Obituary

Thomas F. Manville, chairman of the board of directors and for many years president of Johns-Manville, Inc., and its many subsidiary companies, died in New York from heart disease on October 19. He was sixty-three years of age. Mr. Manville was a leader in the asbestos industry, and through his manufacturing activities had long been well known in the central-station field. He was, in addition to being chairman of the board of the parent company, president and director of the Arizona Asbestos Association, president and director of the Canada Asbestos & Danville Railroad, treasurer and director of the Asbestos Wood & Shingle Company, president and director of the Canadian Johns - Manville Company, Ltd., director of the Dominion Hair Felt Company, director of the Fibre Conduit Company and treasurer and director of the Fibre Corporation. He also was a director of the Fifth Avenue Bank of New York, treasurer and trustee of the Franklin Savings Bank, director of the Kraus Research Laboratories, Inc., president and director of the Manville Securities Corporation, treasurer and director of the Norton Laboratories, Inc., and a director of the Worthington Pump & Machinery Corporation. He was succeeded in March, 1924, as president of the Manville interests by his brother, H. E. Manville.

Clarence O. Barrie, superintendent of equipment and maintenance of the Allis-Chalmers Manufacturing Company, was killed instantly this month when a car in which he was riding was struck by a train near Milwaukee. Mr. Barrie, who was fifty-one years of age, had been connected with the Allis-Chalmers organization for about nineteen years.

Commission Rulings

Neglect to Provide for Depreciation Cannot Be Offset by Imposition of Excessive Charge. — To undertake to build up a depreciation reserve by asking present consumers to pay an excessive percentage was held by the Maine Public Utilities Commission, in a case affecting the Rangeley Water Company, to be unreasonable where the company had failed and neglected in the past to provide a reasonable amount for depreciation. The commission said: "It appears to be the contention of the company that since it has failed or neglected in the past to provide a reasonable amount for depreciation, it should be permitted to recoup its losses in that respect and be allowed a depreciation on a 3 per cent basis. We are not in accord with this suggestion. During the past years the company has paid dividends and in addition has built up a sinking-fund reserve from revenue. To undertake to build up a depreciation reserve by asking the present customers to pay an excessive percentage would be unreasonable. Depreciation is properly an operating expense and as such should have been so treated before the payment of dividends and the setting up of a sinking-fund reserve."

Basis of Issue of Securities to Effect Merger.—Declaring that the merger of small electric light and gas companies into larger units, in accordance with the trend of the times, should result in more economical operation and consequent benefit to the public, and that the interconnection of groups of electric properties is a logical step in the development of any superpower system to make available a source of surplus power to be absorbed into the system and to be transported where there is need therefor, the New Jersey Board of Public Utility Commissioners extended its approval to the consolidation of eleven comparatively small utility companies as the Jersey Central Power & Light Company. The depreciated value of property, determined by deducting retirements and adding net additions to a base previously determined by the board, with factors applied to adjust the values to correspond with present levels of cost, was accepted as the basis for the issuance of securities to effect the merger of these properties. The value of work in progress was included in the basis upon which securities were issued, as was also working capital.

Permission to Install Municipal Equipment Refused and Central-Station Service Urged.—The Indiana Public Service Commission has refused a petition of the city of Greenfield for permission to purchase equipment for the municipal electric power plant to cost $19,800. In its order the commission holds that the purchase is "wholly unnecessary" and sets forth that the city could buy electrical energy at a sum slightly less than the cost to produce it, and it is recommended that arrangements be made to obtain central-station service instead of continuing the operation of the municipal station. It is also pointed out that the city officials had not kept records of operating cost and revenue of the municipal plant for 1923, 1924 and the first half of 1925, as the law requires, and had employed an expert accountant "to make its records" for this period at an expense of $450.

Evaluation Rules Followed by Rhode Island Commission. — In establishing new rate schedules for the Narragansett Electric Lighting Company the Rhode Island Public Utilities Commission followed established rules of commission procedure, basing its findings on a calculated 8 per cent return, making an allowance for federal income taxes and declaring that all relevant facts, including original cost, reproduction cost, money honestly and prudently invested, par value of securities outstanding, market value of securities outstanding, the sum required to meet operating expenses and other facts which are relevant, must be considered in determining the value of the whole or any part of the investment or property of an electric utility for rate-making purposes. The commission in altering certain contract rates asserted that commission approval of a rate schedule fixed by contract for service to a consumer of a special class does not preclude the commission from further jurisdiction over the rates, but, on the contrary, rates for electric service under a contract approved by the commission should be changed by that body when it is found that they are unjust, unreasonable, insufficient and unjustly discriminatory because they yield no return on the value of the property devoted to the service.

Recent Court Decisions

Companies Must Take All Precautions to Prevent Injuries from Power Lines. —In Ellis vs. Ashton & St. Anthony Power Company the Supreme Court of Idaho declared again the principle that "electric companies are held to the highest degree of care practicable to avoid injuring the persons who may accidentally or otherwise come in contact with their wires. Electricity is recognized as one of the most destructive agencies we have, and the highest degree of care and diligence is required by those who are operating electrical plants in order to avoid injury to persons and property." The court further held that the evidence showed that, while the child for whose death by contact with a transmission line along the bank of a canal the action was brought was trespassing on private property, it was customary for people to walk on the embankment and that the company was aware of this practice. The court said: "While, as a rule, a party will not be deemed to anticipate the commission of a willful wrong, yet where, under the circumstances, a technical trespass may reasonably be anticipated, the owner of the premises will be liable for a failure to take reasonable precautions to prevent injuries to the trespasser." (238 Pac. 517.)*

Franchise Rates Fixed Prior to Creation of Commission May Be Overruled by It.—The United States Supreme Court has dismissed for want of jurisdiction, without a written opinion, the appeal of the city of Tulsa, Okla., from a decision of the lower courts favoring the Oklahoma Natural Gas Company and the Corporation Commission of Oklahoma. The case involved gas rates in Tulsa. The company applied to the Corporation Commission of the state for increased rates, which were granted. The city attempted to enjoin the higher rates on the ground that they exceeded rates named in the franchise held by the company from the city, the State Corporation Commission having been created subsequent to the granting of this franchise. The lower courts held, and the Supreme Court by dismissing the appeal affirms, that the State Legislature has legislative authority over the acts of a municipality.

A Utility That "Goes Well" Has a "Going Value."—The Supreme Court of New York, Appellate Division, in New York ex rel. People's Gas & Electric Company of Oswego, criticised the failure of the New York Public Service Commission to allow for going value, on the ground that there was no evidence before the commission on which going value could be allowed. The court said: "As to the question of going value, the commission summarily disposes of it with this terse sentence: 'There is no "evidence before the commission on which going value can be 'allowed.'"' If this means that there is no evidence which would support a finding of going value, it indicates a misapprehension of the situation. That going value is an element which must be taken into consideration in fixing rates is authoritatively established by both the federal and state courts. . . . Of course, there are cases where a property has no going value. But here is a long-established plant supplying a large number of customers, the property of which, as the commission says, is maintained in a good state of efficiency and in respect to which there is oral testimony of competent witnesses as to the amount of the going value. The relator is a going concern and has been for a long time. It seems to go well, and if such is the case it has a going value. To establish such a business and to develop it so that it functions properly costs more than the mere cost of assembling the materials constituting the buildings and providing the necessary tangible equipment." The court also held that the commission had erroneously failed to give dominating weight to the evidence of reproduction cost produced by the public utility and not contested by the city.

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Manufacturing and Markets

Industrial Preparedness

Secretary of War Davis Commends Work of Ordnance Advisory Board and Calls Preparedness Common Sense

"THERE is one great lesson to be learned from our World War experience: Industry cannot win wars, but industry may lose them," said Secretary of War Davis, speaking at a luncheon arranged in his honor at the Bankers' Club, New York, on October 9, by Elbert H. Gary, chairman of the United States Steel Corporation and chairman of the Ordnance Advisory Board of the New York district. "Our most difficult problem in striking a telling blow against aggression is not the man-power problem but the industrial problem. American troops were engaged in battle a year before we could furnish them with adequate munitions. The measures which business men and engineers are now taking constitute a most positive assurance that this perilous state of industrial unpreparedness shall never occur again.

Industrial Preparedness Is Only Common Sense

"Industrial preparedness is not militarism; it is just ordinary common sense. It is not preparation for war, but preparation against war. Far from being antagonistic to peace, national preparedness tends to promote peace. The nation which is prepared to defend itself effectively is far less likely to be attacked than the nation which is weak, spineless and unprepared.

"Industrial preparedness is a businesslike effort to meet a great business problem in a business way. We hope that our nation may avoid future wars; but if we are ever forced into war, we must be ready to bring to our defense the entire resources of our nation, both man power and industrial power. Industrial preparedness is even more difficult and complicated than the mobilization and training of our armies. Just as we have our trained military minds working out military problems, so we must have our trained industrial and engineering minds working out the complex problems of equipment and supply. The security of the country is not the responsibility of the War Department alone; it is the responsibility of every citizen.

"The planning which will make our economic structure strong to do its part in the national defense cannot be done in time of war; it must be done in time of peace. It is your job as well as ours. It means that the saving of literally billions of dollars to the taxpayer if an emergency ever comes again. It means time saved in getting into production, and time saved may mean the difference between defeat and victory. It may well mean the saving of the lives of our boys, hundreds of whom were sacrificed in the last war upon the altar of unthinking unpreparedness."

Co-operation of Industry Asked

Secretary Davis asked for the co-operation of industry, in the interest of the nation's security, with Judge Gary and the Ordnance Advisory Board, and cited the splendid service of the board in its planning work. He also lauded the practical patriotism of American industry and, in concluding, paid a high tribute to Judge Gary, who, he said, had been fittingly described as the great business statesman of America.

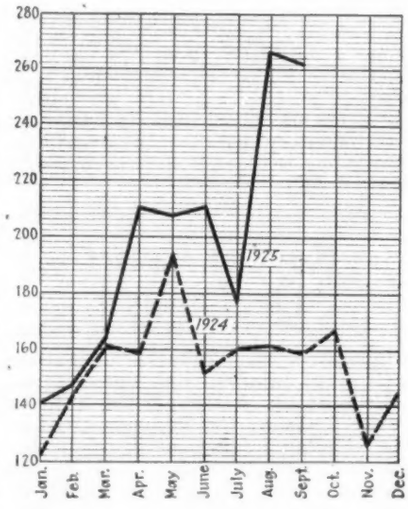
Construction Volume Large

August Volume Greatest on Record—Contracts in July and September Set Record for Periods

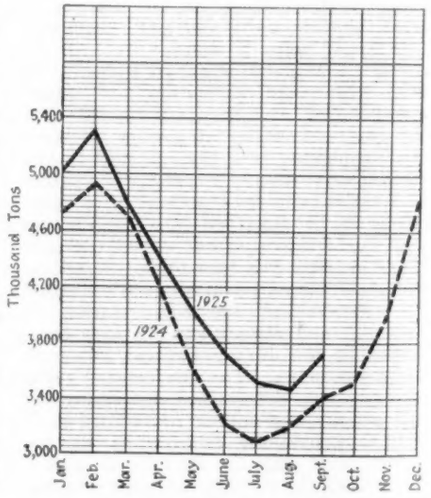
CONSTRUCTION contracts let during each of the months composing the quarter ended September 30 set a record for each month, and in the case of the August construction contracts, amounting to $589,690,200 (F. W. Dodge Corporation report), a new high record was set. The previous high record was in March of this year, with a total of $546,970,700.

In three big districts the construction volume of the past nine months has already exceeded the total construction volume of last year. These districts are New England, the Pittsburgh district (western Pennsylvania, West Virginia, Ohio and Kentucky) and the Central West (Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma and Nebraska). The nine months' volume in the thirty-six Eastern States is less than 4 per cent behind the 1924 total and is greater than the total for any year previous to 1924.

Construction is conspicuous as being very active there are other factors that the mere money value of contracts let. (*Engineering News-Record* statistics.)



CONSTRUCTION VOLUME AS COMPARED WITH AN INDEX OF 100 FOR 1913



UNFILLED TONNAGE AS REPORTED BY THE UNITED STATES STEEL CORPORATION

In the illustration at the left the actual volume of construction is compared and not

VALUE OF CONTRACTS LET IN THE UNITED STATES, QUARTER ENDED SEPTEMBER 30, 1925*

	New England	Middle Atlantic	Southern	Middle West	West of Mississippi	Far West	United States	United States Jan. 1 to Oct. 1
Waterworks	$579,000	$2,754,000	$1,333,000	$3,137,000	$4,732,000	$1,692,000	$14,227,000	$46,754,000
Sewers	276,000	12,995,000	907,000	6,632,000	6,020,000	1,524,000	28,354,000	62,888,000
Bridges	591,000	1,575,000	4,558,000	4,343,000	2,092,000	2,471,000	15,630,000	50,451,000
Excavation, dredging, etc.		391,000	15,448,000	351,000	1,037,000	1,334,000	18,561,000	24,606,000
Streets and roads	6,460,000	29,387,000	21,299,000	28,589,000	26,421,000	11,238,000	123,394,000	347,511,000
Industrial building	6,039,000	8,355,000	13,095,000	20,880,000	26,120,000	2,286,000	76,775,000	165,610,000
Commercial building	37,653,000	173,363,000	26,254,000	54,933,000	40,442,000	29,423,000	362,068,000	963,098,000
Federal government	563,000	1,819,000	1,301,000	261,000	1,157,000	1,345,000	6,446,000	26,107,000
Unclassified	1,038,000	46,320,000	7,936,000	2,215,000	11,934,000	1,228,000	64,677,000	167,605,000
Total for quarter	$53,199,000	$276,959,000	$92,131,000	$121,341,000	$119,955,000	$52,541,000	$710,132,000	
1925, Jan. 1 to Oct. 1	153,212,000	664,149,800	183,326,000	324,346,000	330,052,000	199,545,000	1,854,630,000	
1924, Jan. 1 to Oct. 1	112,180,000	451,952,000	175,097,000	336,657,000	257,868,000	203,959,000	1,337,713,000	

Engineering News-Record statistics.

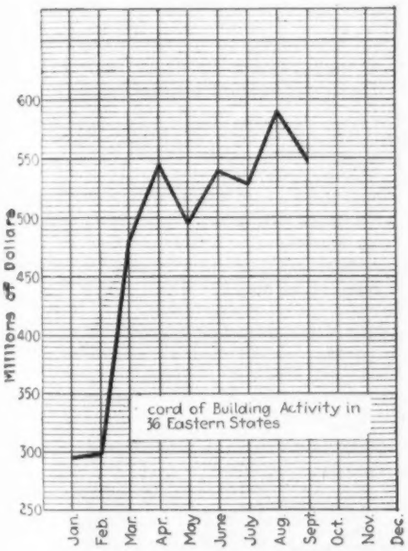
are also very encouraging. The unfilled tonnage reported by the United States Steel Corporation showed its first increase since forward business began to decrease in March of this year. That industry is showing an upward trend with increasing consumption as well as production. Freight loadings have also continued at a record rate and all reports indicate good business.

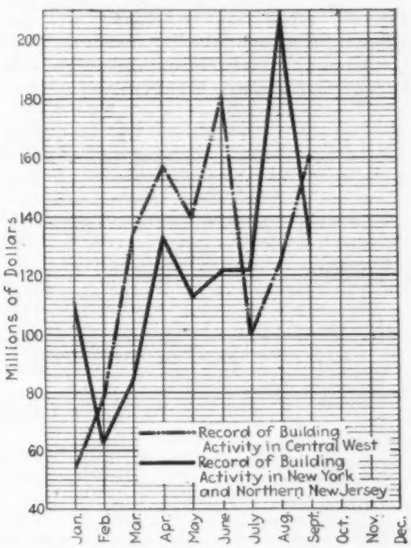
The value of contracts let in the United States segregated as to territorial divisions and types of work is shown in the table on the preceding page. The minimum in each class, observed in arriving at the totals, is as follows: Waterworks and excavations, $15,000; other public works, $25,000; industrial buildings, $40,000; commercial buildings, $150,000.

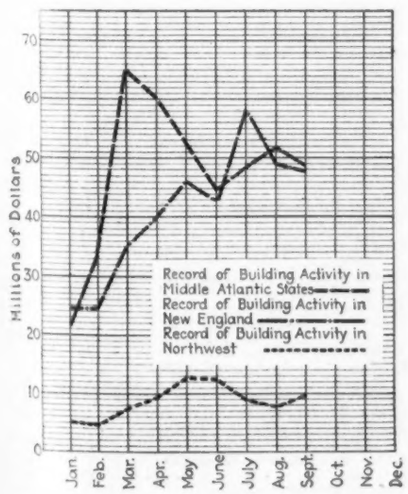
Building Contracts in Thirty-six Eastern States by Territorial Divisions

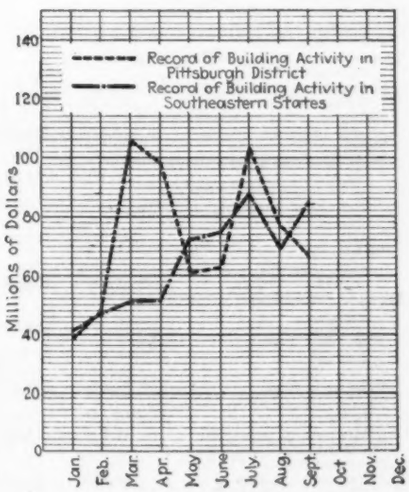
The Contracts in These States Include About Seven-eighths of the Total Construction Volume of the Country

(Compiled from the F. W. Dodge Corporation Building Reports)









The Middle Atlantic States include eastern Pennsylvania, southern New Jersey, Maryland, Delaware, District of Columbia and Virginia.

The Southeastern States include North and South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Louisiana.

The Pittsburgh District includes western Pennsylvania, West Virginia, Ohio and Kentucky.

The Central West includes Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma and Nebraska.

The Northwest includes Minnesota, the Dakotas and northern Michigan.

Electric Power Club as a Business Asset*

Commercial Aspect to Receive More Consideration—Industry Statistics a Vital Need

BY ALFRED E. WALLER
President Electric Power Club

IT SHOULD be a source of special pride to us, in casting up our account, to realize that the valuable and valued technical contributions of the Electric Power Club are only a minor part of what we have been able to do. The major, and by far the most important, accomplishment of the Power Club is the respect and confidence it has created among its members. We can do no better than to build on mutual confidence. Our industry requires close application and a high degree of technical skill. This technical ability, without which the industry could never have been founded and which it must have in order to endure, constantly tends to crowd out the commercial side of our affairs. Our past experience has centered mainly upon engineering problems, and we shall need sustained effort and vigilance to hold a proper balance. It is only natural, therefore, that we should find it necessary to lay aside technical details from time to time and to consider the broader aspect of our work and the means at hand for directing it wisely.

*From an address given at the Electric Power Club's fall meeting at Briarcliff Lodge, Briarcliff Manor, N. Y., October 19, 1925.

NEXT NEED IS FOR FACTS

Given faith, our next need is for facts. Business operations flourish or languish according to the extent that accurate information is intelligently used in their direction. Probably no one deliberately conducts a business at a loss, or wants to, but it is true that the policies of many companies both inside and outside of the electrical industry are based on inexact or insufficient data. This condition is dangerous, not only to those who try to operate with pseudo facts, but to all the rest, for the interests of all the units of an industry, great and small, are closely interwoven.

How shall we obtain the fundamental data that we need? They cannot be purchased—there are no tables of statistics, no business information bureaus, no advisory boards which can tell us the facts we need for the efficient direction of our affairs. Any man or organization who may claim to fill this want will be greeted with derision. Even within the industry there is no single person and no organization which could attempt to furnish all the facts with even the remotest chance of success. Really significant and useful information may be obtained through group action and in no other way. This is not a new thought—it has long been well known to those who are familiar with the situation. It was not until recently, however, that the collection and dissemination of these fundamental data had been considered expedient. These normal and useful functions of trade associations have been held in check by the adverse attitude of the courts.

COURTS NOW APPROVE GATHERING OF STATISTICS

Happily, this condition is now a thing of the past. The decisions of the Supreme Court of the United States on the Maple Flooring Manufacturers' Association and the Cement Manufacturers' Protective Association have cleared the air. The definite limitations of our statistical activities and how they may be carried on will be discussed in a special meeting while we are here. They have been explained in a recent edition of our *News Bulletin* and are worthy of our best consideration and thought. The deep interest which has been shown already and the

widespread approval of the opportunities they offer make it a foregone conclusion that the Electric Power Club will develop them to the utmost. Light is breaking through the clouds, and our membership will wisely take advantage of this fact.

Since we are to devote a special meeting to the subject of industry statistics, this is hardly the time to study their uses in detail. But it is eminently fitting that we should consider their broader significance in our business activities, particularly in relation to the interpretation and use of statistical data when we shall have gathered what we need. Facts are not easily obtained, nor is their possession alone a deliverance from business difficulties. For it is possible to reach an incorrect conclusion by faulty reasoning based on a sound premise or by correct reasoning based on an incorrect surmise. Herein lies danger, for if a man who has correct information studies the unwise policy of another whom he believes to be equally well informed, he is likely to suspect bad faith, not realizing that the less fortunate man has done his best with what there was at hand. It is, therefore, by contributing each what he may to the general knowledge of facts and the utilization of facts that we may prosper. It is less costly to prevent than to repair an error.

INDUSTRY DATA OF PRACTICAL USE

The direct and practical manner in which these considerations apply to our industry cannot be overemphasized. Assuming that the average industry cost of a certain standard article has been published, it is instructive and valuable to any manufacturer as an approximation of what his own should be. If the total industry production of any type apparatus has been published at stated intervals, any manufacturer can compute the proportion that his output bears to the total and can determine whether it is a constant fraction of the total at different times. With information of this kind at hand, in times of declining business, unwise selling policies are less likely to be initiated. Statistics often disclose the need for simplification or standardization; they act as a check upon the lively imagination of promoters whose business it is to bring new capital into the industry. We shall have a convincing explanation while at this meeting of the need for exact information about electrical imports and will hear what is being done to make it available.

The standardized cost accounting manual, used by most of our member companies, is valuable not only on account of its intrinsic usefulness, but also because it insures that individual figures submitted for compilation into industry averages or totals have been similarly compiled. An average of figures which are not strictly comparable is obviously useless. For this reason the Electric Manufacturers' Council is arranging to employ an expert who will devote his entire time to the explanation and application of this cost-accounting system and to the extension of its use among the member companies. In this effort the thought is to perfect machinery for the collection and utilization of facts. It is essential that we shall speak a common language in matters of this kind—every means which makes for unity and efficiency must be brought into play.

The McGraw awards, which are intended to recognize personal efficiency and intelligence, merit our cordial support. They arouse the interest and enthusiasm of the winners and of their associates. By making known the improved methods or devices for which the awards are given they permit others to share the benefits and serve to improve our commercial machinery while building up morale. Given faith and facts, what does the future hold in store for us? We know that we need never fear an act prohibiting the use of electrical apparatus, for our products are useful and beneficial to mankind. In quality, quantity and performance they have no equal in the world. Intelligent vigilance will place us beyond fear of foreign competition. The use of electricity is constantly increasing and, in the more important branches, at an accelerating pace. Any one who has followed the Bonbright awards must be impressed by the almost limitless field for electrical development which they disclose, and surely we who have this prospect spread before us as our own must be thrilled by the challenge it offers. If our progress has seemed slow in the past, it is because we have built securely. Emerged from the shadows, we now can see into the long future, and the means by which we may hold our true direction are at hand. The gods make opportunities and then stand aside; it is reserved for us to consummate the plan.

Large Increase in Electrical Exports During August

EXPORTS of electrical machinery, equipment and supplies during August, 1925, were valued at $8,074,352, an increase of $885,982 over the corresponding month of 1924, according to the Electrical Division of the Department of Commerce. This is the highest total for any month since May, 1921, or in over four years. Shipments during the first eight months of 1925 amount to $55,861,986, but are $1,311,029 less than during the same period of 1924. However, the average monthly exports thus far this year are $6,982,748, which exceeds the monthly averages for 1924, 1923 and 1922. These were approximately $6,840,000, $5,970,000 and $5,260,000 respectively.

VALUE OF ELECTRICAL EXPORTS FOR AUGUST, 1925, COMPARED WITH CORRESPONDING MONTHS IN 1924
(Issued by Bureau of Foreign and Domestic Commerce)

Articles	August 1924	August 1925
Generators:		
Direct-current:		
Under 500 kw.	$71,464	$59,036
500 kw. and over	195,312	49,609
Alternating-current:		
Under 2,000 kva.	16,720	52,410
2,000 kva. and over	240,892	148,416
Steam-turbine generator sets.	7,888	66,012
Accessories and parts for generators	164,276	121,563
Self-contained lighting outfits	94,171	78,409
Batteries:		
Flashlight batteries	61,097	76,613
Other primary batteries	77 308	143,890
Storage batteries	174,072	257,915
Transforming or converting apparatus:		
Power transformers	159,727	325,912
Other transformers	156,052	121,897
Rectifiers, double-current and motor-generators, dynamotors, synchronous and other converters	118,718	7,2415
Transmission and distribution apparatus:		
Switchboard panels, except telephone	82,654	168,946
Switches and circuit breakers over 10 amp.	123,222	291,669
Fuses and fuse blocks	22,154	28,930
Watt-hour and other measuring meters	36,122	33,052
Volt, watt and ampere meters and other recording, indicating and testing apparatus	163,243	169,680
Lightning arresters, choke coils, reactors and other protective devices	68,416	121,181
Motors, starters and controllers:		
Motors, under 1 hp.	134,397	220,435
Stationary motors:		
1 to 200 hp.	199,071	272,784
Over 200 hp.	55,416	57,538
Railway motors	24,634	192,211
Electric locomotives:		
Railway	167,454	.....
Mining and industrial	19,831	10,664
Starting and controlling equipment for:		
Industrial motors	156,750	57,212
Electric railway and vehicle motors	4,200	56,603
Accessories and parts for motors	147,193	289,607
Electrical appliances:		
Electric fans	73,922	87,265
Electric lamps:		
Metal-filament	114,212	127,968
Other electric lamps	31,193	19,255
Flashlights	$52,700	$108,897
Searchlights and projectors	34,897	46,776
Motor-driven household devices	71,436	84,453
Domestic heating and cooking devices	106,157	108,838
Industrial electric furnaces and ovens	11,180	33,941
Therapeutic apparatus, X-ray machines, galvanic and faradic batteries, etc.	103,197	131,208
Signal and communication devices:		
Radio apparatus	541,238	844,379
Telegraph apparatus	30,306	20,269
Telephone apparatus:		
Magneto telephones	20,044	10,957
Other telephones	26,755	40,205
Telephone switchboards	188,095	118,175
Other telephone equipment	205,228	182,367
Railway signals, switches and attachments	72,806	65,217
Bells, buzzers, annunciators and alarms	17,226	13,722
Other electric apparatus:		
Spark plugs, magnetos and other ignition apparatus	122,955	187,443
Insulating materials	129,481	105,887
Metal conduit, outlet and switch-boxes	46,531	91,241
Sockets, receptacles and lighting switches	94,544	131,937
Electric lighting switches, interior and streets	112,377	98,952
Other wiring supplies and line material	78,283	108,607
Other electrical apparatus	708,893	635,211
Globes and shades for lighting fixtures	30,603	46,284
Electrical glassware, except for lighting	12,818	23,917
Electrical porcelain	104,145	†
Electrical porcelain for less than 6,600 volts	*	46,445
For 6,600 volts and over	*	53,030
Carbons, carbon brushes and electrodes	278,198	†
Electrodes for electric furnaces.	*	71,650
Other carbon products	*	217,641
Insulated wire and cable (iron and steel)	25,983	20,776
Other manufactures of aluminum	103,910	79,635
Copper, bare wire	177,190	141,622
Copper, insulated wires and cables	519,413	425,493
Total electrical machinery and apparatus and supplies	$7,188,370	$8,074,352

*Not separately stated prior to January 1, 1925
†Discontinued beginning January 1, 1925

Business Conditions

ELECTRICAL equipment sales continue to show an encouraging upward trend in virtually all districts. The Westinghouse Electric & Manufacturing Company has reported that its sales for the third quarter of the year (the second quarter of that company's fiscal year began April 1) were $43,285,770, which compares with $34,705,397 for the corresponding quarter last year, an increase of nearly 25 per cent. The volume of sales in the industry since October 1 is at a high rate, and, despite the fact that very good business was experienced in the last quarter of 1924, manufacturers believe that the last quarter of 1925 will at least equal the corresponding period last year. Freight-car loadings for the week of October 10 were 1,106,099, the twelfth consecutive week in which loadings exceeded the million-car mark. Fuel activity is on the upward trend, buying and consumption are good and production is on the increase.

In New England the volume of electrical equipment sales is expanding and the buying trend is upward, with a tendency on the part of both industrial plants and dealers to restock. A number of large lighting installations are being made, and a large contract for a factory electrification has just been closed in that district. The volume of business in the New York district continues large, with many small sales being made. Transformer and motor sales are most prominent and building supplies are showing a strong upward trend. In the Southeast the outlook is encouraging and many good inquiries are reported calling for equipment for the electrification of certain mills. One contract was placed for power equipment for a mill in the Carolinas. Distribution construction work is active in the Middle West, and large maintenance purchases are materially helping the volume of sales. On the Pacific Coast an order approximating $400,000 was placed for substation equipment, and three big power projects under way presage large orders for apparatus.

Lead Active, Copper Weakens Slightly and Zinc Advances

THE volume of copper sales has declined and has occasioned a slight cut in the price by some sellers. Zinc, lead and tin are firm, with zinc prices going into new high ground at 8.35 cents, St. Louis. Consumers of copper apparently are not anxious to buy, and such producers as wanted to do business found that they had to cut the price, 14¼ cents delivered being the figure at which most of the business was done during the week.

The lead market is active but is practically unchanged. Lead for prompt shipment is available, but there are practically no large stocks on hand. The market for brass-special zinc has been very active, and as much as 25 points has been realized on large-sized transactions. Consumers are not particularly tempted by the present prices of Straits tin, which have ruled between 62 cents and 63 cents all week, reaching a peak of 62⅝ cents on Wednesday. As a result, it has been almost entirely a London market, with the operators there extremely bullish.

NEW YORK METAL MARKET PRICES

	Oct. 14, 1925 Cents per Pound	Oct. 21, 1925 Cents per Pound
Copper, electrolytic	14⅜	14⅜
Lead, Am. S. & R. price	9⅛	9⅛
Antimony	17¼	17⅜
Nickel, ingot	33½	33⅝
Zinc, spot	8.60–8.62½	8.70
Tin, Straits	62½	62⅝
Aluminum, 99 per cent	28	28

Base copper price Oct. 21, 1925, 16½ cents

Volume of Business Continues Large in the New York District

THE volume of business in the New York district continues large, with many small orders being placed. Transformer and motor sales are particularly active. A large company reports the receipt of an order from a central-station company for a frequency changer, transformers and miscellaneous equipment amounting to $175,000. Many orders are also pending covering large amounts of apparatus. Sales of building construction supplies continue to show a strong upward trend.

A large manufacturer of industrial and commercial lighting equipment reports sales so far this year about 15 per cent higher than for the same period last year and reports a greater interest in improved factory lighting. Wiring devices are in good demand, and appliances are selling well. All manufacturers are optimistic and are looking forward to steady buying for the rest of the year.

Distribution Construction Active in the Middle West

BUSINESS continues good in the Middle West. The employment situation shows steady improvement and the building trades should have plenty of work this winter. Various utility companies are busy with construction plans and a number of substations are being built, with a consequent demand for considerable distribution equipment. Among the interesting orders placed were one for about sixty-five subway-type transformers and seventy current transformers, a forty-thousand-dollar order for circuit breakers and another order for 7,000 5-amp. watt-hour meters and 1,000 direct-current watt-hour meters. Maintenance purchases are helping general business conditions materially.

Jobbers' sales have increased in most instances, and good business appears just ahead. Appliances of all kinds have sold readily, and appliance manufacturers are generally busy. One manufacturer is reported to have orders scheduled for 500,000 cigar lighters for Christmas trade. A manufacturer of washing machines also reports receiving an order for 200 machines.

Outlook in Southeast Encouraging —Many Good Inquiries Noted

ENCOURAGING reports regarding the outlook for business in the Southeast have been received from all sides. Considerable activity is in prospect in all of the territory except those sections hard hit by the long drought, but even in these sections recent rains have lent a more optimistic tone to the situation. The outlook for the citrus crop indicates a crop equaling if not exceeding that of last year. The Atlanta, Birmingham & Atlantic Railway announces that it will immediately undertake improvements at Brunswick, Ga., on rebuilding terminals and slips, the cost of which will be approximately $250,000.

There is a tendency on the part of some industrial plants to prepare for increases in business, and a number of inquiries are in hand looking toward electrification of certain mills. A number of mills in territories not served by the large hydro-electric power companies are making inquiries regarding turbine installations and motor equipment, an Atlanta concern having closed a contract this week for a 2,500-kw. unit in the Carolinas. Jobbers report a satisfactory volume of business in wiring-device lines. Panelboards are selling particularly well, and residential lighting fixtures are in strong demand. A slight slowing down in the movement of line-construction materials was noted during the past week, but this condition is not looked upon as in any way permanent.

Large Order for Substation Equipment Placed on Pacific Coast

THE general tone of business on the Pacific Coast is optimistic, although the volume has temporarily decreased and some districts are reported quiet. This, however, is ascribed to the usual midmonthly dearth of sizable stock orders. Heavy machinery business is especially promising, for besides the three large plants at Melones, Kings River and Feather River, which are almost ripe for purchasing, a large contract has been awarded for the Wilson substation near Merced tying in the 220,000-volt system now under construction by the Great Western Power Company with the present 110,000-volt system of the San Joaquin Power & Light Company. This contract amounted to about $400,000. Another recent job is the resistor equipment for an electric annealing furnace recently installed by a glass works in the San Francisco Bay district. Lumber companies are placing increased orders, especially in the coast redwood belt. Power company business has included orders and inquiries for sixty spoons and tampers, 2,000 lb. No. 8 soft-drawn bare copper wire, 2,000 lb. No. 6 weatherproof wire and other wiring material for the San Joaquin district. In that territory, too, the irrigation companies are active. Railroad busi-

ness from all California roads is good, covering not only special cable and other signaling equipment but also wiring supplies and other material.

Electrical Equipment Sales Expanding in New England

A GRADUAL expansion in the volume of sales of electrical equipment is reported by both manufacturers and jobbers throughout New England. This encouraging expansion is reflected in the favorable buying trend in general and, in addition, in the tendency on the part of both industrial plants and dealers in supplies to restock with electrical commodities. In the district served by the New England Power Company the sales of electric power show over 25 per cent increase to date as compared with a corresponding period in 1924. A strong demand for small motors is reported, and a shortage of stock of such motors has necessitated delayed deliveries. In addition, the call for larger motors is growing stronger.

Pipe, conduit and wire continue to sell in large volume with lighting fixtures, safety switches and wiring devices quite active. Electric lighting is attracting much interest, and a number of large installations in theaters are of outstanding importance. One large central-station company reports a contract for complete factory installation in this district; another records contracts amounting to over $4,000 for one district in northern Massachusetts. Domestic electric appliances are selling in increasing volume, with flatirons most prominent and electric ranges showing a very favorable trend. One central-station company in Connecticut reports fifty range sales during the past month as the result of a local selling campaign. Counter sales of electrical equipment are encouraging, from the standpoint both of volume and of the increasing interest shown in New types of appliances. As reported by a number of jobbers, electrical specialties, including socket units, electrotherapeutic units and varieties of minor appliances for household use are meeting with marked favor on the part of the public.

Activities of the Trade

Sturtevant Business Well Above Last Year's

New business of the B. F. Sturtevant Company, Boston, is running 20 per cent above that of a year ago, and the total orders on the books are 50 per cent higher than was the case last fall. Twenty-five per cent more employees are on the pay roll, and the plant at Hyde Park is now operating at about 70 per cent of its capacity. B. S. Foss, treasurer of the company, has expressed confidence in a gradual improvement in business, with slightly better prices and somewhat lower costs, and a resulting increased margin of profit.

Prices for raw material have, after several years of maladjustment and wide fluctuations, gradually stabilized to the advantage of industry, said Mr. Foss. Present manufacturing conditions are much sounder, despite the fact that the company is still paying war wages. The company recently received a contract for electrically driven ventilating equipment for the Holland tunnels in New York, this contract exceeding half a million dollars and embracing more than eighty fan units.

Westinghouse Orders for Third Quarter of Year Show Increase

The Westinghouse Electric & Manufacturing Company announces that orders entered during the quarter ended September 30 amounted to $43,285,770, which compares with $34,705,397 during the same quarter last year, an increase of nearly 25 per cent. For the first six months of the company's fiscal year, which began on April 1, orders entered amounted to $87,717,970, while for the same period last year orders entered were $74,736,397. Sales billed during the quarter ended September 30 were $40,170,058. For the corresponding quarter last year sales billed were $39,572,995.

Commission Dismisses Complaint Against Cutler-Hammer

The Federal Trade Commission has dismissed its complaint against the Cutler-Hammer Manufacturing Company, Milwaukee. The commission charged the company with lessening competition in the sale of its products by the use of a "tying contract" which was alleged to have required the respondent's customers to purchase from it all controllers which they might require for any purpose whatsoever. Commissioner Humphrey dissented from the majority finding and handed down an opinion stating the grounds for his conclusions.

Holophane Company Acquired by Executives and Employees

The Holophane Glass Company, Inc., 342 Madison Avenue, New York, with factory at Newark, Ohio, and the Holophane Company, Ltd., of Canada have been acquired by a group made up largely of executives and employees who have been associated with the Holophane Company for periods varying from ten to thirty years. The officers of the company now are: Otis A. Mygatt, president; Charles Franck, vice-president and general manager, and Joel B. Liberman, vice-president and treasurer.

The company also announces that the following will continue in their respective positions: William A. Dorey, chief designing engineer; William A. Ingler, superintendent of the works; Thomas W. Rolph, managing engineer of the street-lighting department, and Davis H. Tuck, engineer in charge of industrial lighting. Edward L. Bradbury will be the sales manager. It is said that no effort will be spared to maintain the standing the company has enjoyed in the lighting field and to increase the good will which has been built up in the last three decades.

New Company Formed to Develop Eastern Pole-Treating Facilities

The American Forest Products Company, Madison Avenue and Forty-third Street, New York, has recently been organized and has taken over five pole-butt-treating plants in the East located at the following points: Natural Bridge, Va.; Sylva, N. C.; Ceredo, W. Va.; Nashville, Tenn., and Shipman, Va. These plants were formerly devoted to the treatment of poles for the Bell telephone system.

The new company states that its object is to effect a broader development of Eastern pole-treating facilities than could possibly be obtained by operating these plants for telephone use only. The officers of the company are: W. F. Bancker, president, formerly general purchasing agent of the Western Electric Company; H. P. Marshall, vice-president, formerly in the pole division of the purchasing department of the Western Electric; Y. G. King, secretary and treasurer, formerly general auditor of the Tremont Lumber Company, and H. S. Fisher, staff engineer, formerly with the Western Electric Company.

The Robertson-Cataract Electric Company, Buffalo, wholesale and retail electrical supplier, reports sales of $1,050,229 for the three months ended September 30, which compares with $991,423 in the corresponding period a year ago, an increase of $58,806. The company states that this is the third largest quarter's business in its history.

The Servel Corporation, 51 East Forty-second Street, New York, announces the appointment of Francis Bennett Riley as general manager of the commercial division, effective since October 15. Mr. Riley was formerly manager of the cabinet division of the Kelvinator Corporation of Detroit.

The Pittsburgh Transformer Company, Pittsburgh, Pa., suffered a slight damage to its Manchester plant last Sunday morning owing to a fire in the pattern-storage building of the Rosedale Foundry Company, immediately adjoining. R. V. Bingay, president of the transformer company, says that the fire was confined chiefly to the foundry company's plant and that the damage to his plant will not interfere with production.

The Wm. Wurdack Electric Manufacturing Company, 21 South Eleventh Street, St. Louis, manufacturer of panelboards, switchboards, knife switches, etc., has purchased an industrial site on Clayton Avenue west of Newstead Avenue for a new plant.

The Bryant Electric Company, Bridgeport, Conn., has placed on the market a new combination "Spartan" outlet and tumbler switch, No. 2975. The new device is similar to the No. 117 with the addition of a tumbler switch.

New Trade Literature

RELAYS.—Nalder Brothers & Thompson, Ltd., 97A Dalston Lane, London, E.8, England, have published "The N. C. S. 'Ideal' Relay Book," describing the various types of the "N.C.S." relays, including reverse-current relays, overload induction relays with inverse time limit, the Fawsett-Party ultra-sensitive relay, etc.

EXPANSION JOINTS.—The Mogul Machine Company, Witherspoon Building, Philadelphia, is distributing a folder describing its "double-end-guided" expansion joints for pipe lines for low-pressure, high-pressure and superheated distribution systems.

CHARGING PLUGS AND RECEPTACLES.—The Albert & J. M. Anderson Manufacturing Company, 289 A Street, Boston, has issued bulletin No. 38, covering the various types of Anderson plugs and receptacles for charging the storage batteries of electric vehicles, trucks, tractors and railway cars as well as for batteries for other commercial and industrial purposes. They are also used for the connections of portable electrical apparatus and similar applications. The bulletin also covers the company's special plugs and receptacles — watertight type, special connectors, heavy-duty junction boxes and special flexible insulated cable for use with the various types of plugs and receptacles.

BUILDINGS. — "The Austin Book of Buildings" is the title of catalog No. 20 issued by the Austin Company, Cleveland, which describes and illustrates the modern trends in the design, construction and equipment of industrial and commercial buildings and is also a reference book of building data for executives in charge of building projects. It is divided into three sections. Section 1 gives an exposition of the Austin method of building and also an illustrated story of the breadth of the Austin building service in the United States and foreign countries; Section 2 contains all of the Austin standardized types for manufacturing requirements of over forty industries, from lamps to locomotives, and Section 3 contains illustrations, descriptions, recommendations and comparative costs of various constructions for floors, doors, walls, roof structures, waterproofing, etc.

STEEL FILLER RODS.—"Properties of Steel Filler Rods for Gas and Electric Welding" is the title of a booklet issued by the Chicago Steel & Wire Company, 103d Street and Torrence Avenue, Chicago, which is virtually a treatise on the properties of iron or steel filler rods for both gas and metallic arc welding. Attention is called to the company's various types of "Weldite" for both electric and gas welding.

CENTRIFUGAL PUMPS. — Catalog B issued by the De Laval Steam Turbine Company, Trenton, N. J., covers the De Laval centrifugal, single-stage and multi-stage pumps for waterworks, power plants, sewage, drainage and irrigation systems, etc. It contains descriptions of the various types of the De Laval centrifugal pumps and illustrations of different applications to industry. Characteristic curves of the various types of pumps are included.

ELECTRIC DRILLS.—Bulletin No. 108 issued by the Hisey-Wolf Machine Company describes the Hisey standard-duty portable electric drills.

AUTOMATIC - SWITCHING EQUIPMENT. — The General Electric Company, Schenectady, N. Y., has issued bulletin GEA-24 describing its automatic-switching equipment for reclosing service on 275-volt direct-current circuits and also equipment for automatic sectionalizing and reclosing service. A few cases are cited of typical machine and reclosing feeder combinations. The company is also distributing leaflet GEA-48, calling attention to a vertically mounted combined choke coil and type LG-120 disconnecting switch.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase and agency is desired in Rome, Italy (No. 17,289), for radio parts.

Purchase is desired in Breslau, Germany (No. 17,288), of radio sets and parts.

Purchase is desired in Malaga, Spain (No. 17,291), of radio tubes.

Purchase and agency is desired in Lisbon, Portugal (No. 17,290), for electric sign-flashing apparatus.

Purchase and agency is desired in Palermo, Italy (No. 17,283), for electric vacuum cleaners.

Purchase is desired in Montevideo, Uruguay (No. 17,287), of 26,000 kg. of bare copper wire and 96,000 kg. of lead-covered wire.

An agency is desired in Prague, Czechoslovakia (No. 17,305), for wire and other materials for radio tubes.

Purchase or agency is desired in Caracas, Venezuela (No. 17,281), for wiring devices.

An agency is desired in Berlin, Germany (No. 17,325), for machine tools for machinery building, automobile factories and electrical manufacturing plants.

Purchase is desired in Turin, Italy (No. 17,275), of oil-burning equipment for boilers.

MOTOR-GENERATORS FOR MELBOURNE, AUSTRALIA.—Tenders will be received by the Postmaster-General's Department, Melbourne, Australia, until Dec. 1 for eighteen motor-generators and spare parts. Tenders are also being asked (no date) for motor-generator sets suitable for charging secondary batteries.

OUTDOOR - TYPE TRANSFORMERS FOR NEW SOUTH WALES, AUSTRALIA. —Tenders will be received by the Victorian Government Railways Commission, Melbourne, Australia, until Dec. 16 for ten single-phase, 50-cycle outdoor-type transformers, rated at 1,800 kva.

Construction News

Projects, Plans, Bids and Contracts,
Contemplated or Under Way

New England States

SABATTUS, ME.—The Park Mills, Inc., plan to build a hydro-electric plant, to cost about $30,000, for service at their local mills.

BOSTON, MASS. — The Edison Electric Illuminating Company contemplates building a substation on Bulfinch Street, to cost about $50,000. Bigelow & Wadsworth, 3 Hamilton Place, are architects.

BOSTON, MASS.—Electric power equipment will be installed in the proposed addition to be erected at the plant of the Gillette Safety Razor Company, South Boston to cost about $750,000.

MILFORD, MASS.—Plans are being prepared by E. L. Rawson, 6 Beacon Street, Boston, for an addition to the power plant of the Milford Electric Light & Power Company, to cost about $40,000.

SPRINGFIELD, MASS.—The City Council is planning to install a flood lighting system to illuminate all municipal buildings.

Middle Atlantic States

DANNEMORA, N. Y. — Bids will be received by James L. Long, superintendent of prisons, Capitol, Albany, until Oct. 29 for two electric elevators for the new industrial building at Clinton Prison, Dannemora.

GREENWICH, N. Y. — Permission has been granted the Salem (N. Y.) Light, Heat & Power Company to exercise a franchise in a portion of the town.

JAMESTOWN, N. Y.—The installation of an ornamental lighting system throughout the downtown section and along some of the main highways leading to the outskirts of the city, the Board of Utilities, has announced will be undertaken early in the spring.

NIAGARA FALLS, N. Y. — The City Council has authorized the City Manager to secure estimates of cost of the installation of ornamental lamps on Ontario Avenue, from Main to Eleventh Street; Eighteen Street from Whitney to Ontario Avenue, and Eleventh Street from Buffalo Avenue to East Falls Street.

OSWEGO, N. Y.—Plans for the proposed group of new buildings to be erected for the Oswego Rayon Company include a power station.

WOODMERE, N. Y. — A movement has been started by the Woodmere Business Men's Association for the installation of ornamental street lamps along Broadway, from Neptune Avenue to Hartwell Place.

ENGLEWOOD, N. J. — Bids will be received by the Council of Englewood, City Hall, until Nov. 4 for the construction of a fire station. Separate bids to be submitted for heating, plumbing, electric wiring and fire-alarm system.

JERSEY CITY, N. J. — The Public Service Electric & Gas Company, Newark, has taken out a permit to construct a storage and distributing plant at 515 St. Paul's Avenue, to cost about $55,000.

BETHLEHEM, PA.—Plans has been filed by the Central Railroad of New Jersey, 143 Liberty Street, New York, for its proposed local car and locomotive repair shops with power house, to cost about $2,454,000.

CONSHOHOCKEN, PA. — Plans for the proposed rebuilding of the lime hydraulic plant of the Cox Lime & Stone Company, include a power plant.

HILLSVILLE, PA.—Plans for the proposed new local crushing and loading plant to be erected by the Lake Erie Limestone Company, Youngstown, Ohio, to cost about $90,000, include a power plant.

PHILADELPHIA, PA. — The Pennsylvania Railroad Company, Broad Street Station, plans to install electric power equipment at its proposed produce yard and terminal in South Philadelphia, to cost about $1,500,000.

BALTIMORE, MD.—The Board of Estimates has approved preliminary plans for the installation of an electric traffic signal system in the downtown district, to cost about $70,200.

FREDERICKSBURG, VA.—The Virginia Railway & Power Company, Richmond, contemplates extensions in its transmission line in this section, in connection with the acquisition of the plant of the Spottsylvania Power Company.

WILLIAMSBURG, VA.—The plant of the Williamsburg Power Company has been acquired by the Virginia Railway & Power Company, Richmond. Improvements will be made in the local plant, to cost about $45,000.

WASHINGTON, D. C. — Bids will be received by the General Purchasing Officer, Panama Canal, Washington, until Nov. 4, for twenty-four storage batteries, three air compressors, etc. (Panama Circular 1703).

WASHINGTON, D. C. — Bids will be received by the Chief Signal Officer, United States Army, Washington, until Oct. 28, for 21,000 ft. submarine cable and 7 cable reels (Circular C. P. 22159-12).

North Central States

DETROIT, MICH.—Plans are being prepared by A. Kahn, 1,000 Marquette Building, for a power plant for the Herman Kierfer Hospital, Hamilton and Blaine Avenues, to cost about $200,000.

CLEVELAND, OHIO. — Bids will be received at the office of the Commissioner of Purchases and Supplies, City Hall, until Oct. 30 for weatherproof copper wire for the Division of Light and Power.

CLEVELAND, OHIO. — Plans are under way for extension of the ornamental lighting system in the west and southwest districts of the city. Work, it is stated, will start in the spring on installation of the lamps in West Twenty-fifth Street to Brooklyn Bridge, and from Brooklyn Bridge in Pearl Road to West Thirty-fifth Street.

LORAIN, OHIO.—An ordinance has been passed by the City Council providing for the installation of an ornamental lighting system on Pearl Street from Twenty-eight to Thirty-second Street, and on two blocks on Twenty-eight street.

TOLEDO, OHIO.—The B. A. Berry Packing Company, 19 South Huron Street, plans to build a power station, at its proposed packing plant on the Eggleston Road, to cost about $100,000. Charles Kornfeldt, 462 Woodrow Boulevard, is architect.

TOLEDO, OHIO.—The establishment of an ornamental lighting system in Lewis Avenue from Sylvania to the city limits has been approved by the committee on gas and lights. The committee has also authorized an estimate of the number of lamps necessary to illuminate the concrete road around Bay View Park.

BELVIDERE, ILL.—The Illinois Northern Utilities Company, Dixon, has applied to the Commerce Commission for permission to erect a transmission line from Belvidere to South Beloit.

CHICAGO, ILL.—Application has been made by the Public Service Company of Northern Illinois to the Commerce Commission for permission to erect and operate a 132,000-volt transmission line between its station No. 9 at Joliet and the western limits of the city of Chicago.

CISSNA PARK, ILL. — The Central Illinois Public Service Company, Springfield, has applied to the Commerce Commission for permission to erect a transmission from Cissna Park to Claytonville to supply electricity in that community.

EAST DUNDEE, ILL. — The Public Service Company of Northern Illinois, Chicago, has applied for authority to extend its transmission lines in the village of East Dundee, covering a distance of about 4 miles.

ELKHART, ILL.—The Elkhart Electric Light Company has applied for permission to build an electric distribution system in Elkhart and to maintain the necessary system from the transmission line of the Illinois Traction System.

MOUNT PULASKI, ILL. — The Mount Pulaski Electric Heat, Light & Power Company has applied to the Commerce Commission for permission to erect and operate a 13,000-volt transmission line from the power plant of the Lincoln (Ill.) Water & Light Company to the Pulaski power plant with necessary substations, etc.

SPRINGFIELD, ILL. — The Central Illinois Public Service Company has petitioned the Commerce Commission for authority to construct and operate an electric transmission line from Hutsonville through West York to West Union and to operate a distribution system in each of said communities; also a line from Robinson to Flat Rock and to operate a distribution system in Flat Rock, and to erect a transmission line from its substation in Effingham to its substation in Olney.

STAUNTON, ILL.—Bids will be received by the city of Staunton until Oct. 30 for waterworks improvements, including five motor-driven pumps, a filter plant, 2 miles of electric transmission line and 2 miles of telephone line, etc. The W. A. Fuller Company, Railway Exchange, St. Louis, is engineer.

KILBOURN, WIS. — Plans have been adopted by the Southern Wisconsin Power Company, Madison, to replace the present 25-cycle generator with a 60-cycle, vertical type generator of 3,125 kw. capacity.

RHINELANDER, WIS. — The City Council has approved the installation of an ornamental lighting system on Stevens Street, from Rives to Frederick Streets.

STEVENS POINT, WIS. — Plans are under way by the Wisconsin River Paper & Pulp Company to raise the head of its dam, near Plover, to develop more power to operate the new pulp grinding machinery to be installed.

DULUTH, MINN. — Bids will soon be asked by the State Board of Administration, Capitol Building, St. Paul, for the construction of a power plant in connection with the proposed addition to the local State Teachers' College. The entire cost is estimated at $275,000. C. H. Johnston, Capitol Bank Building, St. Paul, is architect.

MOORHEAD, MINN.—Bids will be received by C. G. Price, city clerk, until Oct. 27 for equipment for the addition to the municipal electric power plant, now under construction. Toltz, King & Day, Inc., St. Paul, is engineer.

CEDAR RAPIDS, IOWA—Permission has been granted the Iowa Railway & Light Company for the erection of a transmission line to connect with the plant of T. M. Sinclair & Company, where a substation will be built.

GILMORE CITY, IOWA—Plans for the proposed local cement mill of the Marquette Cement Manufacturing Company, 140 South Dearborn Street, Chicago, to cost about $1,000,000, include a power plant.

MUSCATINE, IOWA — The Board of Supervisors has granted a franchise to Frank Holcomb, Clarence Redman and associates, to construct and operate an electric transmission line along the Maple Grove Road in Sweetland Township.

MALDEN, MO.—Bids will be received by the city of Malden until Oct. 28 for improvements to the electric light plant and waterworks, including two motor-driven triplex pumps of 300 gallons capacity, one uniflow engine, an alternating-current generator, switchboard, piping, boiler, heater, feed pumps, etc. Frank L. Wilcox, Chemical Building, St. Louis, is engineer.

HAMILTON, N. D.—The Council is considering the erection of a transmission line to Crookston, Minn., to secure electricity from the plant of the Red River Valley Power Company.

HARVEY, N. D.—The Otter Tail Power Company, Fergus Falls, Minn., plans extensions in its transmission line in this section.

RUSSELL, KAN.—The Western Kansas Refining Company plans to build an oil refinery here, including a power plant, to cost about $300,000.

Southern States

GATESVILLE, N. C.—The installation of an electric light plant is under consideration by the Town Commissioners.

FLORENCE, S. C.—The Sparrow Lumber Company, recently organized, plans to build a power house at its proposed local mill to cost about $100,000.

INVERNESS, FLA. — Bonds to the amount of $11,000, have been voted for the installation of an ornamental lighting system in the downtown district. E. V. Camp and Associates, Atlanta, Ga., are engineers.

KEY WEST, FLA.—Bids will be received by J. Otto Kirchheiner, Chairman, Board of County Commissioners of Monroe County, Key West, until Oct. 29 for construction of a boulevard, consisting of apron wall, sidewalk, etc., lighting systems and two timber bridges, around a portion of the Island of Key West, a distance of about 6 miles.

SEBASTIAN, FLA.—Bids will be received by the City Council until Oct. 26 for the ice plant, generating unit, etc., as follows: For one ten-ton electric-motor driven raw water ice plant complete; one 100 to 200-hp. Diesel oil engine directly connected to generator, complete with switchboard, and construction of iron corrugated building with foundations for machinery. Plans are on file at the office of Carter & Danerow, Vero Beach.

ELIZABETHTON, TENN.—Plans for the proposed local artificial silk mills to be built by the American-Bemberg Corporation, to cost about $1,500,000, include a power house. Lockwood, Greene & Company, Boston, are engineers.

KINGSTON, TENN. — The Southern Cities Power Company, Chattanooga, is planning to erect a transmission line from Kingston to Oliver Springs, at cost of about $50,000.

SELMER, TENN.—The County Commissioners have granted the Southern Cities Power Company, Chattanooga, a franchise to construct and maintain electric transmission lines on various roads in McNair County.

GUIN, ALA.—The Alabama Power Company, Birmingham, has petitioned the Public Service Commission for authority to erect a transmission line (13 miles long) from Guin to Sulligent and a distribution system in Sulligent; also a distribution line (10 miles long) from Sulligent to Vernon, with a distribution system in the latter.

BILOXI, MISS.—Bids are being asked by Holmhaven on the Gulf, Inc., 2800 West Beach Street, for developing several new sub-divisions including a development of 350 acres near Biloxi and will require materials for electric lighting system, street paving, etc.

MADISONVILLE, LA.—The Town Council has granted an electric light franchise to the Madisonville Improvement Company, which is being organized to install an electric lighting system here.

BERWYN, OKLA.—Plans are under way by the Town Council for the erection of a transmission line to secure electricity for local service. The Gantt-Baker Company, First National Bank Building, Oklahoma City, is engineer.

OKLAHOMA CITY, OKLA.—Plans are under way by the Oklahoma Gas & Electric Company, for the erection of a 13,200-volt transmission line, 20 miles long, to serve the towns of Ripley, Coyle and Perkins. The cost is estimated at $40,000. Byllesby Engineering Company, 231 South La Salle Street, Chicago, are engineers.

ASHERTON, TEX. — The proposal to issue $35,000 in bonds for an electric plant and $30,000 for waterworks system, will be submitted to the voters.

LA FERIA, TEX.—The property of the La Feria Light & Ice Company has been acquired by the Valley Electric & Ice Company, San Benito. Improvements, including the installation of new equipment is contemplated by the Valley company.

MARBLE FALLS, TEX.—The Marble Falls Textile Mills Company, recently organized, plans to build a hydro-electric power plant for service at its proposed local cotton mill.

Pacific and Mountain States

ELLENSBURG, WASH.—The City Council has authorized extensions and improvements in the municipal electric power plant, as advised in the report submitted by Baar & Cunningham, Spaulding Building, Portland, Ore., consulting engineers, to cost about $250,000.

LONG BEACH, CAL.—The City Council has approved the installation of ornamental lamps on Pier Avenue, Bay Shore Drive, Fifty-second and Fifty-third Streets, and other streets in the Alamitos Bay district. R. D. Van Alstine is city engineer.

LOS ANGELES, CAL.—Bids will be received by the Board of County Supervisors, Mechanical Department, Hall of Records, until Nov. 2, for lighting fixtures for the new Hall of Justice.

NAPA, CAL.—Plans for the proposed local sugar refining plant of the Northwestern Sugar Refining Company, Bank of Italy Building, Oakland, to cost about $1,000,000, include a power house.

OAKLAND, CAL.—The City Council plans to install a synchronized electric traffic signal system in the business section, to cost about $16,000. Carl E. Hardy is city electrician.

SAN FRANCISCO, CAL.—Bids will soon be asked by the Constructing Quartermaster, Fort Mason, for a 150 kw. turbo-generator for the Letterman General Hospital, Presidio.

UKIAH, CAL. — The Snow Mountain Water & Power Company has applied to the State Department of Public Works for a permit to take 400 ft. of water a second from the South Fork of the Eel River to generate power at three plants. The company plans to build two new hydro-electric plants, to cost about $3,200,000, one to be located in Coyote Valley, and the other at Scott's Dam, to have a total capacity of 43,336 hp. The water after passing through the present plant on Gold Creek and the two proposed plants will be emptied into the Russian River.

VENTURA, CAL.—Petitions are being circulated by the Ventura Chamber of Commerce for the installation of ornamental street lamps on Ventura Boulevard from Eureka Drive to Saugus Avenue, a distance of about 6 miles.

KINGMAN, ARIZ.—Plans for new ore mill to be erected by the Fillmore Mining Company, to cost about $100,000, include a power plant.

YUMA, ARIZ.—Bids will be received at the office of the Bureau of Reclamation, Yuma, until Nov. 16 for the construction of the building and foundations, the installation of machinery, etc., for the siphon drop power plant, Yuma project, Arizona-California. This work also includes the installation of two 1,160-hp. vertical hydraulic turbines, generators, transformers, switchboard, etc., wire, cable and lighting fixtures. No structural materials or electrical equipment are to be purchased under this advertisement.

Canada

WINNIPEG, MAN.—A proposal has been submitted to the Council to equip the high-pressure pumping plant for electrical operation by J. G. Glasco, manager of the Hydro-Electric System, and W. P. Brereton, city engineer. The gas engines now in use will be retained for use in case of emergency. The cost is estimated at $61,000.

GOWGANDA, ONT.—Arrangements have been made by the Castle-Trethewey Mines, Ltd., with the Northern Canadian Power Company, Timmins, for power service. The power company plans to erect a transmission line from a point near Elk Lake to Gowganda, a distance of 29 miles.

NELSON, ONT.—The Township Council has entered into an agreement with the Hydro-Electric Power Commission of Ontario for electric power service.

TORONTO, ONT.—The Hydro-Electric Power Commission contemplates extending its transmission lines to Port Rowan, Port Ryerse and St. Williams, at a cost of about $40,000.

TEMPLETON, QUE.—The Papineauville (Que.) Lumber Company, Ltd., has applied to the Public Utility Commission for permission to erect a 6,600-volt transmission line to Templeton. The cost is estimated at $50,000.

SIMPSON, SASK.—A by-law will be submitted to the ratepayers to authorize $7,000 to establish an electric light plant here.

Electrical Patents

Announced by U. S. Patent Office

(Issued September 22, 1925)

1,554,365. ELECTRIC COOKER; F. P. Parker and I. E. Jaggers, Wichita Falls, Tex. App. filed March 1, 1923. Which may be operated by a storage battery.

1,554,385. MACHINE FOR SECURING FAN BLADES TO END PLATES; F. R. Still, Detroit, Mich. App. filed Oct. 7, 1921. As on rotors of machines.

1,554,423. AUTOMATIC CUT-OUT FOR ELECTRIC MOTORS; J. A. Driy and J. J. Janca, St. Louis, Mo. App. filed March 7, 1921.

1,554,438. DYNAMO-ELECTRIC MACHINE; E. P. Lee, Rochester, N. Y. App. filed May 10, 1922. With compact field winding.

1,554,459. ENTRANCE SWITCH; L. E. Norquist, Denver, Col. App. filed Sept. 5, 1924. Safety type with interlocked cover.

1,554,469. SEAT SIGNAL; V. W. Thomson, El Paso, Tex. App. filed April 17, 1922. For theaters.

1,554,482. ELECTRIC HEATING AND COOKING APPARATUS; H. Aumann, Berlin, Germany. App. filed June 6, 1924.

1,554,502. ELECTRIC WATER HEATER; G. E. Hulse, New Haven, Conn. App. filed March 15, 1923. For heating water as required.

1,554,528. ELECTRIC SWITCH; J. Sachs, Hartford, Conn. App. filed Feb. 7, 1922. Means for muffling or quenching any arcs.

1,554,546. SEAM-WELDING PROCESS; J. B. Austin, Cleveland, Ohio. App. filed April 4, 1925.

1,554,561. SOUND-REPRODUCING MECHANISM; L. de Forest, New York, N. Y. App. filed Aug. 2, 1919. For reproducing sound from sound records.

1,554,578. SERVICE TABLE; J. T. Harrison, Asbury Park, N. J. App. filed Jan. 13, 1923. Electrically heated.

1,554,647. ELECTRIC MOTOR; A. E. Oswald, Bogota, N. J. App. filed Nov. 30, 1920. Adaptable for use with direct current or alternating current.

1,554,648. PROTECTIVE SYSTEM; H. Pearce, Rugby, England. App. filed Nov. 8, 1921. For alternating-current distribution systems.

1,554,652. TIME-ELEMENT DEVICE; E. Pons, Schenectady, N. Y. App. filed Nov. 22, 1920. For circuit control.

1,554,664. TRANSFORMER; H. O. Stephens, Pittsfield, Mass. App. filed March 19, 1925. With disk coils of adjacent stacks connected alternately in series.

1,554,667. REGULATING SYSTEM; L. W. Thompson, Schenectady, N. Y. App. filed April 21, 1924. Speed regulation of a dynamo.

1,554,675. ELECTRIC HEATER; R. M. Horsey, Montreal, Quebec, Canada. App. filed May 12, 1924.

1,554,681, 1,554,682. APPARATUS FOR TREATING THE SCALP; A. Merke, New York, N. Y. App. filed Dec. 11, 1922.

1,554,694. STARTING SWITCH FOR SINGLE-PHASE MOTORS; R. J. Wolfe, Rochester, N. Y. App. filed June 7, 1920.

1,554,698. SURGE PREVENTER; E. F. Alexanderson, Schenectady, N. Y. App. filed Dec. 22, 1923.

1,554,702. INDUCTION MOTOR; S. R. Bergman, Nahant, Mass. App. filed Nov. 29, 1924. Squirrel-cage type.

1,554,704. PROTECTIVE SYSTEM; J. Biermanns, Karlshorst, Germany. App. filed Jan. 15, 1925. For electric circuits.

1,554,711. ELECTRIC CONVERSION; S. Cabot, Brookline, Mass. App. filed Feb. 21, 1922. System of polyphase rectification, using a commutator.

1,554,718. SWITCH-OPERATING MECHANISM; W. P. Dryer, Schenectady, N. Y. App. filed Dec. 15, 1920. For oil switches.

1,554,720. ELECTRIC ARC DEVICE; C. V. Ferguson, Schenectady, N. Y. App. filed Dec. 3, 1918. Applicable as a rectifier for charging small storage batteries.

1,554,730. CONTACT FOR TOY ELECTRIC RAILWAY CAR LIGHTING; H. C. Ives, Bridgeport, Conn. App. filed Aug. 6, 1924.

1,554,736. ELECTRIC SMELTING FURNACE; B. G. Klugh, Anniston, Ala. App. filed June 10, 1920.

1,554,753. ELECTRIC LAMP SOCKET WAFER FUSE; J. P. Nielson, New York, N. Y. App. filed Sept. 22, 1923.

1,554,795. RADIO SIGNALING SYSTEM; L. de Forest, New York, N. Y. App. filed May 10, 1915.

1,554,812. ELECTRIC HEAT RADIATOR; F. Girard, Hanau-on-the-Main, Germany. App. filed June 10, 1922.

1,554,823, 1,554,824. CONTAINER; W. Knoblock, Long Island City, N. Y. For storage-battery cells. App. filed May 29, 1924.

1,554,829. ELECTRIC STOVE FOR RAPID HEATING; J. Renning, Munich, Germany. App. filed June 3, 1924.

1,554,915. METHOD OF CALIBRATING INSTRUMENTS FOR THE TRANSMISSION OF ANGULAR MOTION; E. M. Hewlett and W. W. Willard, Schenectady, N. Y. App. filed April 12, 1923.

1,554,927. EXCITING CIRCUITS; H. Sundaussen, Essen, Germany. App. filed Feb. 18, 1915. Of a releasing magnet.

1,554,980. METHOD OF AND MEANS FOR CALIBRATING INSTRUMENTS FOR THE TRANSMISSION OF ANGULAR MOTION; A. L. Ellis, Lynn, Mass. App. filed June 21, 1923.

(Issued September 29, 1925)

16,176 (reissue). SAFETY-SWITCH MECHANISM; L. Siebert, San Francisco, Cal. App. filed Oct. 17, 1921.

1,544,999. AUTOMATIC TELEPHONE SYSTEM; J. E. Gardner, Chicago, Ill. App. filed Oct. 27, 1922.

1,555,000. ELECTRIC SWITCH; W. J. Gibbons, Philadelphia, Pa. App. filed March 10, 1924.

1,555,001. TELEPHONE SIGNALING SYSTEM; E. A. Gray, Rosylin, N. Y. App. filed Oct. 1, 1921.

1,555,002. TELEPHONE-EXCHANGE SYSTEM; E. A. Gray, Roslyn, N. Y. App. filed June 25, 1923. Method of operating long-distance toll telephone lines.

1,555,009. PANEL FOR RUNNING LIGHT SYSTEMS; J. W. Haywood, New York, N. Y. App. filed Nov. 7, 1923. As on ships.

1,555,020. MOTOR-REVERSING MEANS; E. G. Parvin, Roselle, N. J. App. filed Oct. 21, 1924.

1,555,034. MACHINE FOR WELDING TUBULAR ARTICLES; A. M. Stanley, Lynn, Mass., and J. E. Sims, Quincy, Mass. App. filed May 11, 1921.

1,555,041. DISTORTION MEASURING SYSTEM; G. S. Vernam, Brooklyn, N. Y. App. filed May 25, 1923. For telephone signaling system.

1,555,042. TRANSMITTING HANDWRITING AND PICTURES; G. S. Vernam, Brooklyn, N. Y. App. filed July 12, 1923.

1,555,059. AUTOMATIC TELEPHONE SYSTEM; E. Jacobsen, Chicago, Ill. App. filed May 20, 1918.

1,555,065. MOUNTING FOR CONDUCTORS IN ELECTRICAL MACHINERY AND METHOD OF APPLYING SAME; D. L. Lindquist, Hartsdale, N. Y. App. filed Nov. 5, 1923.

1,555,066. SPLIT-CORE TRANSFORMER; S. L. Lines, Toronto, Canada. App. filed Sept. 25, 1922. For testing.

1,555,071. MOTOR-REVERSING MEANS; E. G. Parvin, Roselle, N. J. App. filed March 31, 1925.

1,555,074. MULTI-CIRCUIT-CONTROLLING SWITCH; G. D. Pogue, Mount Vernon, N. Y. App. filed Feb. 28, 1921.

1,555,076. ELECTRIC DEVICE; E. Raboni, New York, N. Y. App. filed Sept. 19, 1923. Electromagnet for use with electric bell, buzzer, etc.

1,555,113. DEVICE FOR INDICATING STATIONS; T. S. Gould, Brooklyn, N. Y. App. filed Oct. 23, 1924. For vehicles as street cars.

1,555,130. ELECTRICAL SWITCH; D. J. McCarthy, Elgin, Ill. App. filed March 6, 1922. Adapted to railway signaling and similar fields.

1,555,151. ELECTRIC SWITCH; G. A. Parsell, St. Louis, Mo. App. filed Oct. 18, 1922. In the form of permutation locks.

1,555,166. ELECTRIC WELDING MECHANISM; E. W. Smith, Cleveland Heights, Ohio. App. filed Feb. 28, 1924.

1,555,195. MUTIPLE FUSE PLUG; O. F. Foss, Atlantic City, N. J. App. filed June 19, 1922.

1,555,210, 1,555,211. TELEGRAPH SENDING INSTRUMENT; J. A. Hulit, Chicago, Ill. App. filed June 12, 1922.

1,555,244. MOTOR CONTROL SYSTEM; A. A. Gazda, Wilkinsburg, Pa. App. filed Feb. 3, 1917. For effecting dynamic braking of alternating-current motors.

1,555,249. TESTING APPARATUS; G. W. Pickard, Newton, Mass. App. filed April 23, 1920. For mica or other dielectric or insulating materials.

1,555,251, 1,551,252, 1,555,253. ELECTRICAL CONDENSER; W. H. Priess, Belmont, Mass. App. filed June 7, 1921. For high-potential use in radio-communication circuits.

1,555,258. HIGH-FREQUENCY DIELECTRIC FURNACE; C. T. Alcutt, Pittsburgh, Pa. App. filed Oct. 27, 1923.

1,555,259. HIGH-FREQUENCY-CORONA-DISCHARGE FURNACE; C. T. Alcutt, Pittsburgh, Pa. App. filed Oct. 27, 1923.

1,555,264. CURRENT COLLECTOR; L. F. Burnham, Wilkinsburg, Pa. App. filed July 5, 1922. For trackless trolleys.

1,555,266. PROTECTIVE DEVICE FOR MEASURING INSTRUMENTS; L. W. Chubb, Edgewood Park, Pa. App. filed Nov. 16, 1918. Insulation-testing instruments.

1,555,267. FUSIBLE CUT-OUT FOR PERCOLATORS; O. A. Colby, Irwin, Pa. App. filed June 10, 1922.

1,555,268. ELECTRIC AIR HEATERS; O. A. Colby, Irwin, Pa. App. filed May 9, 1923.

1,555,269. TOASTER WITH ATTACHED CORD; O. A. Colby, Irwin, Pa. App. filed May 9, 1923.

1,555,270, 1,555,271, 1,555,272, 1,555,273, 1,555,274. TERMINAL FOR HEATING ELEMENTS; O. A. Colby, Irwin, Pa. App. filed Aug. 30, 1923.

1,555,276. TEMPERATURE-CONTROL SYSTEM; W. C. Dixon, Wilkinsburg, Pa. App. filed Nov. 16, 1921. For electric furnaces.

1,555,281. METHOD OF RECORDING SOUND BY TRANSFERENCE; J. Engl and J. Massolle, Berlin-Grunewald, Germany, and H. Vogt, Berlin-Wilmersdorf, Germany. App. filed July 18, 1924.

1,555,289. INSULATOR; R. P. Jackson, Edgewood Park, Pa. App. filed Sept. 16, 1918. Strain insulators.

1,555,291. ARRANGEMENT FOR THE TELECONTROL OF GUNS OR THE LIKE; P. Kaminski, Berlin, Germany. App. filed Aug. 25, 1921. Signaling arrangement.

1,555,292. ELECTRIC FURNACE HEATING UNIT; A. D. Keene, Pittsburgh, Pa. App. filed July 20, 1923.

1,555,293. ELECTRIC FURNACE; A. D. Keene, Pittsburgh, Pa. App. filed Aug. 18, 1923. Resistor type.

1,555,299. CIRCUIT INTERRUPTER; H. G. MacDonald, Murrysville, Pa. App. filed Feb. 6, 1922. Means for extinguishing arcs that are formed during the operation of a circuit breaker.

1,555,318. MEASURING DEVICE; H. Sell, Siemensstadt, near Berlin, Germany. App. filed Oct. 30, 1923. For measuring sound energy.

1,555,321. DOUGH-PROOFING OVEN; J. C. Woodson, East Pittsburgh, Pa. App. filed May 28, 1923.

1,555,332, 1,555,333, 1,555,334, 1,555,335 RADIANT ELCETRIC HEATER; V. G. Vaughan, Wilkinsburg, Pa. App. filed May 19, 1923.

1,555,336. AUTOMATIC BREAD TOASTER; V. G. Vaughan, Wilkinsburg, Pa. App. filed July 14, 1923.

1,555,337. HEATER-BRICK TERMINAL; V. G. Vaughan, Wilkinsburg, Pa. App. filed July 20, 1923. Terminal for heating unit as used in an electric range.

1,555,338. WATER-HEATER SYSTEM; V. G. Vaughan, Wilkinsburg, Pa. App. filed Aug. 18, 1923.

1,555,339. ELECTRIC AIR HEATER; V. G. Vaughan, Wilkinsburg, Pa. App. filed Aug. 18, 1923.

1,555,356. CRUCIBLE FOR ELECTRIC FURNACES; M. S. Clawson, Upper Montclair, N. J. App. filed July 9, 1923.

1,555,366. ELECTROMAGNETIC SOUNDING APPARATUS WITH TWO EXCITING WINDINGS; W. Hahnemann, Kitzeberg, near Kiel, Germany. App. filed April 8, 1921.

1,555,371. LAMP ADAPTER; S. G. Hinckley, Gladbrook, Ia. App. filed April 30, 1923. For adapting straight or slip base lamps to screw socket fittings.

1,555,401. ELECTRIC FURNACE; C. A. Cadwell, Cleveland, Ohio. App. filed Nov. 8, 1922. Resistor type.

1,555,419. THERMOSTAT; L. J. Kimmel and G. Torreson, Spokane, Wash. App. filed Dec. 15, 1922. For use in refrigerating plant of the domestic type.

1,555,424. APPARATUS FOR THE PRODUCTION OF HYDROGEN AND OXYGEN; E. G. Luening, Chicago, Ill. App. filed March 21, 1921.

1,555,443. SWITCH; M. B. Stazak, Chicago, Ill. App. filed Jan. 14, 1921. Operated by a solenoid magnet as used in connection with a group of contacts for electrically operated organs.

1,555,468. ELECTROPLATING MACHINE; W. F. Hall, Matawan, N. J. App. filed Oct. 11, 1924.

1,555,528. COMMUTATOR; A. Tauber, Yonkers, N. Y. App. filed Oct. 11, 1923. As used on the generator of motor-vehicle machines.

1,555,542. ELECTRIC FURNACE AND HEATING ELEMENT THEREFOR; J. Young, Welland, Ontario, Canada. App. filed Jan. 7, 1924.

1,555,543. HEATING UNIT; H. A. Ziola, Toledo, Ohio. App. filed Feb. 5, 1925. For electric hot plates, etc.

1,555,547. METHOD AND MEANS FOR STRIKING AND SUSTAINING A LOW-VOLTAGE ARC; J. Bethenod, Paris, France. App. filed Nov. 27, 1923. In electric welding.

1,555,633. SECRET SIGNALING SYSTEM; L. Burch, Belleville, N. J. App filed Dec. 9, 1922. Between radio stations.

Financial and Corporate

Utility Stocks Lower

Moderate Declines Are Registered Over List, but Some Stocks Hold Up in Good Form

IN THE list of power and light stocks the announcement of Secretary Mellon's tax proposals brought a period of quick advances and declines, just as it did for industrial and railroad issues, but utilities as a whole stood lower at the end of the week under review than before.

It was only natural perhaps that the stock that recently had shown the best forward movement should have lost most in the recent speculative decline. United Light & Power class A shares had risen from well under 100 to around 160, but suffered a reaction in the week under review of about ten or fifteen points, part of which loss, it must be added, is explained by the removal of a dividend. Rumors of a four-to-one split for the shares of the Northern States Power did not prevent that issue from losing ground, and before the end of the week it was down six points.

Among the other losers were American Superpower A and B stocks, each of which declined about four points; Power Corporation of New York, which fell six points, and Southern California Edison, which fell five. More modest losses were suffered by such issues as American Gas & Electric, Carolina Power & Light, Electric Investors, General Gas & Electric B stock and Northern Ontario Power & Light. These losses were, it should be noted, offset by advances of substantial character in Lehigh Power Securities and Mississippi River Power. The former gained eight and the latter four points.

On the New York Stock Exchange North American Company's shares remained a favorite in the public utility group on persistent reports that new earnings aided by the acquisition of properties have materially swelled the value of the stock.

New Stock Issue of Potomac Electric Power Company. — Last week marked the opening of subscription lists to a Potomac Electric Power Company issue of $2,000,000 in 6 per cent preferred stock, series of 1925, par value $100 per share, which is offered at $98.50 per share. This is the first offering of the utility where preference has been given to consumers and employees. The stock was oversubscribed six times. The proceeds will be used to reimburse the company for expenditures made for extensions, additions, betterments and improvements.

Brooklyn Edison Plans to Issue $15,000,000.—The Brooklyn Edison Company purposes to issue $15,000,000 of new stock to increase the outstanding capitalization from $60,000,000 to $75,000,000, M. S. Sloan, president of the company, announces. A petition for consent has been filed with the Public Service Commission at Albany. If approved, the directors probably will authorize the issue at their next meeting, October 27. On the basis of the ratio of the new stock to the outstanding stock, the stockholders would have the right to subscribe at par at the rate of one share of new stock for each four shares of existing stock held. It is hoped to have the new stock ready for issue December 1. The proceeds will be used to reimburse the treasury for capital expenditures.

Company Reports

The following statements of earnings have been issued by electric light and power companies for September:

Name of Company	Gross Earnings for September 1925	1924
Central Maine Power	$338,960	$320,705
Columbia Gas & Electric	2,635,624	1,713,733
Detroit Edison	936,294	611,840
Kansas City Power & Light	773,852	724,157

The following earnings statement for August was made:

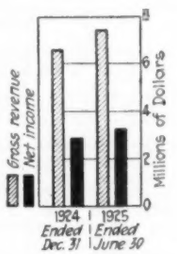
	Gross Earnings for August 1925	1924
Utah Power & Light	$829,611	$778,480

Utilities Power & Light Corporation

Stockholders Receive an Alternative of Dividends in Additional Class A Stock Instead of in Cash—Shares Are Listed on Stock Exchange

BY PAUL WILLARD GARRETT

AMONG the relatively few public utility companies whose shares are listed on the New York Stock Exchange and active in the trading there may be named the Utilities Power & Light Corporation. Organized originally as the Utilities Development Corporation, the company did not adopt its present corporate name until about three years ago, in 1922.



UTILITIES POWER & LIGHT CORPORATION'S INCOME SHOWS AN INCREASE OF $1,000,000 IN 1925

Properties directly or indirectly under the control of the Utilities Power & Light Corporation may be found in six states—Iowa, Minnesota, Wisconsin, Illinois, Rhode Island and New Jersey. Perhaps the better known utilities under control of this organization are the Interstate Power Company and the Eastern New Jersey Power Company. The Interstate Power Company and its subsidiaries operate in southern Minnesota, northeastern Iowa, southwestern Wisconsin and northern Illinois. It controls the Dubuque Electric Company and the Interstate Power Company of Wisconsin. The Eastern New Jersey Power Company operates along the Atlantic coast of New Jersey, serving such places as Asbury Park, Spring Lake, Belmar, Bradley Beach, Sea Girt, Allenhurst, Loch Arbour and Deal. With it are merged the Electric Light & Power Company of Hightstown and the Jamesburg Electric Company, Brown's Mills Electric Light & Power Company, New Egypt Light, Heat, Power & Water Company and the Atlantic Coast Transportation Company.

While the Utilities Power & Light Corporation serves approximately three hundred communities with such services as electric light and power, gas, steam heat, water, electric railway and motor-coach transportation, its net income is derived to the extent of 88 per cent of the total from electric light and power activities.

The Utilities Power & Light Corporation itself is free from funded debt, and in its capitalized structure will be found only three classes of stock. Cumulative 7 per cent preferred stock is outstanding to the amount of 50,000 shares, class A stock (listed on the Stock Exchange) is outstanding to the amount of 183,219 shares, and Class B stock is outstanding to the amount of 330,000 shares.

A consolidated statement of earnings for the twelve months ended June 30, 1925, shows gross income of $7,440,449 for the Utilities Power & Light system, a total that indicates pretty clearly that the company's income this year will run a million dollars higher than last. Income for the calendar year 1924 was, for example, $6,557,089. After deducting $4,167,922 for operations, maintenance, renewals and taxes, there was left $3,272,526 as net income for year ended June 30, 1925. To figure how much was available for the class A stock further deductions of various descriptions must be made that would bring the balance down to $1,338,938. It will thus be seen that a very substantial amount is indicated for the class A stock, enough, in fact, to cover

the dividend requirements by a wide margin.

Dividends on the class A stock have been declared at the annual rate of $2 a share, but to holders of the class A stock the right is now given to take payment in additional stock in lieu of cash if they so desire. Both the July 1 and October 1, 1925, dividends were offered to those who chose additional class A stock at the annual rate of one-tenth of a share for each share held.

Utility Securities and Savings Banks

New York State Savings Bank Association Recommends to State Legislature Bill to Legalize Investment in Such Issues— M. S. Sloan Shows Their Stability

ON OCTOBER 14 a convention of the Savings Banks Association of the State of New York, held in New York City, passed unanimously a resolution indorsing a bill to come before the next State Legislature to legalize public utility securities as investments for savings banks in New York State. On this occasion a notable address was made by M. S. Sloan, president of the Brooklyn Edison Company.

Mr. Sloan, after expressing his complete accord with the expressed desire to limit the proposed investment to "good" securities of "good" utility companies, went on to discuss, first, the regulation by public service commissions and, second, the holding company. State regulation, he said, was adopted because public utilities are held by our laws to be affected with a public interest—to be, in other words, quasi-public institutions. Its purpose was to conserve the rights and interests of the public and also the rights and interests of the utility companies in the various phases of furnishing public service which was recognized as vital to the wellbeing of individuals and communities. The commissions generally set the standard of service, prescribe the form of accounting, supervise the capitalization and have jurisdiction over the rates. The utility companies have no guarantee of prosperity. They must earn what they get, but, on the other hand, they are protected against confiscation.

Growth of Security Market

"We have seen in recent years," Mr. Sloan said, "a wide extension of the market for utility securities. The public buys them readily. Moreover, the employees of the companies buy them, and the customers buy them in the hundreds of millions of dollars each year directly from the companies. This employee ownership and customer ownership of utilities is one of the outstanding features of public utility development. In a comparatively few years it has grown in volume so that sales of junior securities made directly to the people with whom the utilities come into close daily contact yield a not small part of the companies' capital requirements.

"Obviously such sales could not be made unless these purchasers had complete confidence in the financial soundness and integrity of management of the companies, and more, in their enlightened public policies. It is needless to say that the utilities welcome and encourage this local and intimate community partnership. It puts management on its mettle as nothing else could. Moreover, it is excellent insurance against unreasoning and unreasonable hostility to public service organizations.

"Employee ownership, customer ownership and the large purchasing of utility securities by the general public in the market furnish testimony, we of the utilities believe, to the regard the public has for the merits of our industry and also to its acceptance of state regulation and approval of it. The basis has been laid for an enduring utility structure. We know that the material of that structure is good, progressive service at rates which must be fair and reasonable, yet which will yield a profit if it can be earned, and policies which are liberal and broad-minded and public-spirited in considering the public's interests, the community's interests, at the same time the wellbeing of the utility companies is considered."

Place of Holding Company

Declaring that the holding company is becoming increasingly important to the public utilities, Mr. Sloan said:

"It might more properly be called an investment-management company, since that is what it really is. These companies organize or acquire operating public utilities, which they control through ownership of their junior securities. The subsidiary companies usually are in different states, frequently widely separated. Thus they operate under different conditions, and this diversity tends to assure an average of profit from the operations of all. This is to the advantage of the parent company. The advantages to the subsidiary or operating company are that the parent company can help it in the most economical financing; it can place at its disposal the highest quality of technical brains and experience; it can save money by massed purchasing; it can by system operation of subsidiary companies produce large savings and reduce investments compared with what would be necessary in individual operation.

"It is not suggested that these companies be included among those whose bonds should be eligible for savings banks' investments. They are not subject to public service commission jurisdiction, since they are not operating utilities. I mention them because I believe they are destined to play an ever-larger part in the future of the utility industry. Utilities have ceased to be local concerns, save in our very largest cities. Many of them serve large areas containing many communities. There is under way a process of consolidation of utilities into larger companies and into groups under common ownership—the so-called holding-company ownership which very frequently is combined with customer ownership of the operating companies through large sales of preferred stock to the public locally served. All this is natural, healthy, inevitable. It is desirable so far as the public is concerned, because it results invariably in improved service and in marked economies in investment and operating charges. These economies are reflected in a lowering of rates to customers or in keeping stationary rates which otherwise might have to be increased. It is desirable so far as the utilities are concerned, because such consolidations, whether into larger operating companies or into groups of operating companies under common ownership, result in utilities stronger financially, therefore better able to make economies and having a larger and diversified market.

"The investment-management company which facilitates this process of consolidation, therefore, is an agency of good both for the public and for the utility business. It is no detriment to the position of an operating utility that it is owned by a holding company. It may be, very often is, the best possible thing for that utility and for the holders of its preferred stocks and bonds.

"I believe this tendency toward consolidation which is the dominant trend in our industry today is as much the result of state regulation of utilities as it is of the natural processes of business to meet heavily and rapidly increasing demands with larger and larger sources of supply. We have the incentive of good business toward economical operation, which is reinforced by the policy of the commission to keep rates reasonable and lower them wherever possible. These elements inevitably tend to produce consolidation —the condition under which economies can best be accomplished. At the same time we have the assurance that if we operate honestly, wisely, with sound judgment, our companies will not be deprived of the reasonable profits which such operation earns and deserves.

"These things mean much, I believe, to the public utilities as institutions and to the people who invest in their securities. We have under the system certain advantages which other businesses do not have; we have corresponding restrictions which other businesses do not have. Both are attributable to the quasi-public nature of our business, and I know both are for the benefit of the public and the utilities when the system of state regulation is wisely administered as it is today. Public utility securities, wisely chosen, have become and will continue to be desirable investments. With the incentives to good performance and good management which state regulation adds to those incentives always present in business, the utilities as a business group may fairly be said, I think, to offer investment opportunities not surpassed by any other business which requires a steady flow of new capital."

Ohio Edison Makes Stock Offering.—The Ohio Edison Company, subsidiary of the Commonwealth Power Corporation, is offering stockholders rights to subscribe at par and accrued dividends

to 6.6 per cent preferred stock to the amount of $400,000 at the rate of one share of new stock for each fifteen shares of old.

Alabama Power to Issue Bonds.—The Alabama Public Service Commission has authorized the Alabama Power Company to issue first mortgage lien and refunding gold bonds amounting to $4,000,000 and 50,000 shares of no-par-value cumulative preferred stock to be sold at not less than $100 per share.

Havana Company Reorganization Indorsed.—Holders of the majority of the capital stock of the Havana Electric Railway, Light & Power Company have deposited their stock under the agreement for exchange of securities of that company for securities of the newly formed Havana Electric & Utilities Company. The plan of exchange calls for the deposit of both preferred and common stocks of the old company. For each ten shares of Havana Electric company preferred the holder is to receive ten shares of the new 6 per cent cumulative first preferred stock, three shares of new common stock and $40 cash. For each ten shares of Havana Electric company common the holder will receive twenty shares of the new cumulative preference stock, twenty shares of new common and $200 cash.

Dividends Declared

The quarterly dividends listed below were announced during the past week by electric light and power and electric manufacturing companies:

Name of Company	Per Cent	When Payable
Brazilian Traction, Light & Power	1	Dec. 1
Columbia Gas & Electric, com.	0.65	Nov. 16
Columbia Gas & Electric, preferred, Series A	$1.75	Nov. 16
Consumers Power, 6% pf.	1½	Jan. 2, '26
Consumers Power, 6.6% pf.	1.65	Jan. 2, '26
Consumers Power, 7% pf.	1¾	Jan. 2, '26
Consumers Power, 6% pf.*	0.50	Nov. 2
Consumers Power, 6% pf.*	0.50	Dec. 1
Consumers Power, 6% pf.*	0.50	Jan. 2, '26
Consumers Power, 6.6% pf.*	0.55	Nov. 2
Consumers Power, 6.6% pf.*	0.55	Dec. 2
Consumers Power, 6.6% pf.*	0.55	Jan. 2, '26
Electric Investors, Inc., 7% pf.	1¾	Nov. 2
Electric Investors, Inc., 6% pf.	1½	Nov. 1
Fort Worth Power & Light, pf.	1¾	Nov. 2
Idaho Power, pf.	1¾	Nov. 2
Knoxville Power & Light, pf.	1¾	Nov. 2
Long Island Lighting, com.	0.50	Nov. 2
Middle West Utilities, com†	$1.25	Nov. 16
Pacific Power & Light, pf.	1¾	Nov. 2
Penna.-Ohio Power & Light, 8% pf.	2	Feb. 1, '26
Portland Gas & Coke, 7% pf.	1¾	Nov. 2
Sierra Pacific Electric Co., pf.	1¾	Nov. 2
Standard Power & Light (Del.) pf.	$.75	Nov. 2
Standard Power & Light (Md.) pf.	$1.75	Nov. 2
Texas Power & Light, pf.	1¾	Nov. 2

* Monthly. † Unofficial.

Public Service Corporation to Offer Stock.—Directors of the Public Service Corporation of New Jersey have authorized the issuance at par and dividends of 115,500 shares of 6 per cent cumulative preferred stock. This is the first issuance of 6 per cent preferred to be offered to the present holders of the 8 per cent and 7 per cent cumulative preferred stock, in the proportion of one share for each four shares held as of October 7.

Canadian Company Issues Report.—The first annual financial report of the Ottawa-Montreal Power Company, Ltd., shows gross revenues for the twelve months, ended June 30 to have been $261,261. Operating expenses were $129,221, bond interest $83,061, depreciation reserve $20,000, tax reserve $2,900 and preferred dividends $19,432, leaving a balance of $6,646 for the year.

New Stock Offered by Consolidated of Baltimore.—Holders of the existing common stock of the Consolidated Gas, Electric Light & Power Company of Baltimore whose names appear on the books on November 2 will have the right to subscribe to additional common stock at $35 a share in the proportion of one share of stock for each five shares now held. These rights will result from the action of the directors of the local power company in authorizing an issue of 140,257 shares of new common stock, which will be offered directly to the company's shareholders. This action is provisional on approval from the Public Service Commission.

Stock and Bond Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Saturday, Oct. 17	Low 1925	High 1925
STOCKS			
Abitibi Pwr. & Paper, com.—no par	69½	62	75½
Adirondack Pwr. & Lt.—7% pf.	101½	98	106
Adirondack Pwr. & Lt.—8% pf.	105	103	115
Adirondack Pwr. & Lt., com.—50	75	31	98
Ala. Pwr., pf.	103	97½	103
Allis-Chalmers Mfg. pf.	108	103½	108½
Allis-Chalmers Mfg., com	f 93¼	71	95
Amer. & Foreign Pwr., pf. 25% pd.	135	133½	142
Amer. & Foreign Pwr., 7% pf.	92½	87	94
Amer. & Foreign Pwr., com.	f 45½	27½	51⅛
Amer. Bosch Magneto, com.—no par	f 35½	26½	54½
Amer. Brown, Boveri, ptc., stk.	f 50½	50	52
Amer. Elec. Pwr., pf.	c 102¼	96	104½
Amer. Gas & Elec., 6% pf.—no par	91	85	91
Amer. Gas & Elec., com.—no par	80	70	85
Amer. Lt. & Trac., 6% pf.	101	93	101½
Amer. Lt. & Trac., com.	235	139	236
Amer. Pwr. & Lt., 6% pf.	92	84	91½
Amer. Pwr. & Lt., com.—no par	58	52	67
Amer. Pub. Serv., 7% pf.	90	88	94
Amer. Pub. Serv., com.	47	45	90
Amer. Pub. Utilities, 4% pf.	78	....	....
Amer. Pub. Utilities, 6% pf.	78	71	82
Amer. Pub. Utilities, 7% pf.	87	87	95
Amer. Pub. Utilities, com.	81	70	103
Amer. Superpwr., pf.—25	f 27½	24½	27½
Amer. Superpwr., Class A—no par.	f 41½	26½	39½
Amer. Superpwr., Class B—no par.	45	27	41
Amer. Wtr. Wks. & Elec., 7% pf.	100½	97	103
Amer. Wtr. Wks. & Elec., com.	f 52	34½	68½
Appalachian Pwr., 7% pf.	98	92	100
Appalachian Pwr., 1st pf., 7%	100	95	101
Appalachian Pwr., com.—no par	78	70	83
Arizona Pwr., 7% pf.	78	75	87
Arizona Pwr., com.	25	15	33
Arkansas Cent. Pwr., pf., $7—no par	100	97	102
Arkansas Lt. & Pwr., 7% pf.	98	92	102
Arkansas Lt. & Pwr., com.	100	65	101
Asheville Pwr. & Lt., 7% pf.	f101	98	102½
Assoc. Gas & Elec., 7% pf.—1% extra—50	f 50	....	....
Assoc. Gas & Elec., pf.—$6—no par	f 85	....	....
Assoc. Gas & Elec., Class A	f 37	....	....
Babcock & Wilcox, com.	147	....	....
Birmingham Elec. pf.—$7—no par.	100	98	101½
Blackstone Valley Gas & Elec., com.—50	90	....	....
Brazilian Trac., Lt. & Pwr., com.	f 79½	....	....
Broad River Pwr., pf.	94	90	97
Brooklyn Edison, com.	f142½	120½	147
Buffalo Gen. Elec., com.	63	44	73½
Buffalo, Niagara & East. Pwr., pf. 2%	f 23½	....	....
Buffalo, Niagara & Eastern Pwr., com.	f 27½	....	....
Carolina Pwr. & Lt., pf.—$7—no par	103	100	107
Carolina Pwr. & Lt., com.	410	290	440
Central Ariz. Lt. & Pwr., pf.	100	100	106
Central Ark. Ry. & Lt., 7% pf.	96	91	98½
Central Ill. Pub. Serv., 6% pf.	86	84	93
Central Ind. Pwr., 7% pf.	89	88	95
Central Pwr. & Lt., pf.	92½	88	95
Central States Elec., 7% pf.	94	87	98
Central States Elec., com.	190	70	200
Chicago Fuse Mfg., com., no par	a35	27½	39½
Cincinnati Gas & Elec., com.	g87½	82	90
Cities Service, 6% pf.	f 83	80	84
Cities Service, pf. B—10	f 7¼	7½	8
Cities Service, pf. BB—100	f 79	....	....
Cities Service, com.	38	34	43
Cities Service, Bks. Shrs.	17½	16½	22
Cleveland Elec. Illg., 6% pf.	102	101	105
Cleveland Elec. Illg., com.	240	200	250
Colorado Pwr., 7% pf.	96	93	98
Columbia Gas & Elec., 7% pf.	f112½	104½	113
Columbia Gas & Elec., com.—no par	f 83½	45½	84⅛
Columbia Ry., Gas & Elec., 6% pf.	90	90	90
Columbus Elec. & Pwr., 2d pf.	f100	....	....
Columbus Elec. & Pwr., com.	f134	....	....
Columbus Ry., Pwr. & Lt., pf. A	97	86	99
Columbus Ry., Pwr. & Lt., pf. B	90	80	85
Columbus Ry., Pwr., & Lt., com.	150	114	150
Commonwealth Edison, com.	a139½	130½	141⅛
Commonwealth Pwr., 6% pf.	82½	80	85½
Commonwealth Pwr., com.—no par.	32	30½	43⅛
Conn. Lt. & Pwr., 8% pf.	115	115	118
Conn. Lt. & Pwr., 7% pf.	106	105	110
Cons. Gas of N. Y., pf.	f 58	....	....
Cons. Gas of N. Y., com.—no par	f 91¾	74½	94½
Cons. Gas Elec. Lt. & Pwr. of Balti., 6% pf.	c105	102	105
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	e110	105	110½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	c112½	109	114
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	e125½	122	127½
Cons. Gas, Elec. Lt. & Pwr. of Balti., com.—no par.	c 44	32	47½
Cons. Utilities of Penna., 7% pf.	j 85	80	84
Consumers Pwr., 6% pf.	95	90	97
Consumers Pwr., 6.6% pf.	101	97	102
Continental Gas & Elec., 7% ptc. pf	94½	85	97
Continental Gas & Elec., 7% pr. pf.	94	89	95
Continental Gas & Elec., com.	150	77	145
Crocker Wheeler, com.	15	21	28
Crocker Wheeler, pf.	..	65	80
Dallas Pwr. & Lt., 7% pf.	102	100	102½
Dayton Pwr. & Lt., 6% pf.	95	88	100
Dayton Pwr. & Lt., com.	420	180	460
Detroit Edison, com.	151½	110	159½
Dubilier Condenser & Radio, com.	f 16	....	....
Dubuque Elec., 7% pf.	90	80	90
Duquesne Lt., 7% pf.	111	104	112
East. Tex. Elec., 7% pf.	100	100	105
East. Tex. Elec., com.	80	70	75½
Edison Elec. Illum. of Boston, com.	d210	200	213
El Paso Elec., com.	f 72	....	....
El Paso Elec., pf.	f100	....	....
Elec. Bond & Share, 6% pf.	f104	101½	106½
Elec. Bond & Share Sec., com.—no par	f 65½	56½	80½
Elec. Investors, 6% pf.	94	95	96
Elec. Investors, com.	62	30	66
Elec. Investors, 10% pd. receipts	44	15	48½
Elec. Pwr. & Lt., ctfs. pf.	91½	89½	94
Elec. Pwr. & Lt., ctfs., 40% pd.	107½	100	110
Elec. Pwr. & Lt., ctfs., com.	35½	17½	40½
Elec. Storage Battery, com.—no par	f 70½	60½	71½
Elmira Wtr., Lt. & R.R., 7% pf.	94	93	98
Empire Dist. Elec., 6% pf.	80	78	85
Engr. Pub. Serv., pf.	99	100	103
Engr. Pub. Serv., com.—no par	21	22½	30
Eureka Vacuum Cleaner, com.—no par	53½	42	52½
Fairbanks Morse, com.	f 51½	32½	51½
Federal Lt. & Trac., com.	f 30	26	36
Federal Light & Traction, pf.	f 82½	82½	86½
Federal Utilities, pf.	f 75	....	....
Federal Utilities, com.	f 17	....	....
Ft. Worth Pwr. & Lt., 7% pf.	f106	99½	107½
Galveston-Houston Elec., 6% pf.	64	70	75
Galveston-Houston Elec., com.—no par	17	32	40
Gen. Elec., com.	f303	227½	337½
Gen. Elec., special—10	11	10½	11½
Gen. Gas & Elec., 6% pf.	205	72	240
Gen. Gas & Elec., 7% pf.	165	120	175
Gen. Gas & Elec., com.	200	72	240
Gen. Gas & Elec., (Me.) pf.—$7—no par	130	90	175
Gen. Gas & Elec., (Me.) pf.—$8—no par	140	104½	180
Gen. Gas & Elec. (Del.) com. A no par	56½	42	64½
Gen. Gas & Elec. (Del.) com. B no par	52	40	62
Gen. Gas & Elec. (Del.) A pf. 7% no par	95	97½	100
Gen. Gas & Elec. (Del.) A pf. 8% no par	105	90	110
Gen. Gas & Elec. (Del.) B pf. 7% no par	94	88	96
Ga. Lt., Pwr. & Rys., 6% pf.	78	74	85
Ga. Lt., Pwr. & Rys., com.	60	25	74
Ga. Ry. & Elec., 5% pf.	f 83	78½	84½
Ga. Ry. & Elec. com.	f124½	115½	115½
Ga. Ry. & Pwr., 8% pf.	f112	....	....
Ga. Ry. & Pwr., 7% pf.	f102	....	....
Ga. Ry. & Pwr., 4% pf.	103	62	110
Ga. Ry. & Pwr., com.	104	62	118
Gt. Western Pwr., 7% pf.	h 101½	98½	103½
Havana Elec. Ry., Lt. & Pwr., com.	f 240	112	246
Havana Elec. Ry., Lt. & Pwr., pf.	f116	115	116
Hurley Machine, com.—no par.	a 49½	41½	56
Idaho Pwr., 7% pf.	100½	97½	102
Ill. No. Utilities, 6% pf.	88	82	92
Ill. Pwr. & Lt., 7% pf.	97½	92½	98
Int. Combustion Engr., com.—no par	f 48½	31½	51
Int. Utilities, class A—no par	f 33½	31	46½
Int. Utilities, class B—no par	f 8½	6½	17
Interstate Pwr., pf., $7, no par	90	90	97
Interstate Pub. Serv., 7% pf.	96	90	100
Iowa Ry. & Lt., 7% pf.	97	92	100
Jersey Central Pwr. & Lt., 7% pf.	95	90	96

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco. *i*Bid, low, high, Tuesday, Oct. 20. *j*Latest quotations available.

Stock and Bond Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Saturday, Oct. 17	Low 1925	High 1925
STOCKS—Continued			
Jersey Central Pwr. & Lt., com	45	15	50
Johns-Manville, com.—no par	f162	....	....
Kansas Gas & Elec., 7% pf	f100	97½	102
Kelvinator Corp., com.—no par	f 59	....	....
Kentucky Hydro-Elec., com	a 91	90½	91
Kentucky Sec., 6% pf	73	67	78
Kentucky Sec., com	82	77	87
Kentucky Utilities, 6% pf	90	82	95
Kings County Ltg., 7% pf	f100	....	....
Laclede Gas Lt., com	f 168	110½	178
Lehigh Pwr. Sec., com.—no par	147	82	155
Long Island Ltg., 7% pf	104½	100	105
Long Island Ltg., com	120	60	105
Los Angeles Gas & Elec., 6% pf	95½	90	97
Manila Elec., com.—no par	40½	28½	49½
Maytag Mfg., com	f 25	....	....
Memphis Pwr. & Lt., pf., $7, no par	101½	98½	102
Metropolitan Edison, pf.—$6—no par	95	95	96
Metropolitan Edison, pf., $7, no par	104	100	110
Middle West Utilities, 7% pf	a96½	91½	98½
Middle West Utilities, 7% pr. lien pf	a105	98	107
Middle West Utilities, com.—no par	a110½	82½	125
Midland Utilities, pr. ln. pf	a 99½	98½	101
Milwaukee Elec. Ry. & Lt., 8% pf	100	98	105
Milwaukee Elec. Ry. & Lt., 7% pf	98	96	105
Milwaukee Elec. Ry. & Lt., 6% pf	87	83½	87
Minn. Pwr. & Lt., 7% pf	f100	96½	102
Miss. Pwr. & Lt., pf	f100	....	....
Miss. River Pwr., 6% pf	94	87½	94
Miss. River Pwr., com	113	37	114½
Montana Pwr., com	f 87½	64	99½
Montreal Pwr., com	f217½	....	....
Mountain States Pwr., pf	f 93	....	....
Mountain States Pwr., com	f 26	....	....
National Carbon, pf	a122	120	130
National Elec. Pwr., pf	94½	94	96½
National Lt., Ht. & Pwr., 5% pf	67	40	65
National Lt., Ht. & Pwr., com.—no par	11	11	....
National Pwr. & Lt., pf., $7—no par	100½	95	99
National Pwr. & Lt., com.—no par	395	185	403
National Pub. Serv., 7% pf	f 95	....	....
National Pub. Serv., pfc. pf	f 98	....	....
National Pub. Serv., A com.—no par	25½	22½	30
National Pub. Serv., B com.—no par	17	14	20
Nebraska Pwr., 7% pf	f102	98½	103½
Nevada-Calif. Elec., com	j38½	31	50½
N. J. Pwr. & Lt., 7% pf	104	92	102
New Orleans Pub. Serv., 7% pf	99	94	102
New Orleans Pub. Serv., com.—no par	j 30	31	38½
N. Y. Central Elec., 7% pf	97	96	101
Niagara Falls Pwr., 7% pf.—25	28½	27½	29
Niagara, Lock. & Ont. Pwr., 7% pf	j106	101½	110
Niagara, Lock. & Ont. Pwr., com.—no par	j 63	60	73
Nizer Corp., A.—no par	f 63½	37	70
Nizer Corp., B.—no par	f 63½	....	....
No. Amer., 6% pf.—50	f 48	46½	50½
No. Amer., com.—50	f 68½	41½	69½
No. Caro. Pub. Serv., pf.—$7—no par	90	90	96
No. N. Y. Utilities, 7% pf	f101½	....	....
No. Ohio Pwr., com	12	5	13½
No. Ohio Trac. & Lt., 6% pf	73	64	75
No. Ont. Lt. & Pwr., pf	78	68	78
No. Ont. Lt. & Pwr., com	49	41	52
No. States Pwr., 7% pf	99	95	100
No. States Pwr., com	125	103	127½
No. Texas Elec., 6% pf	50	60	75
No. Texas Elec., com	40	40	70
Ohio Gas & Elec., 7% pf	90	87	100
Ohio Pwr., 6% pf	92	85	95
Ohio Pub. Serv.: 7% pf	97½	97	100
Ohio River Edison, 7% pf	97	93½	100½
Oklahoma Gas & Elec., pf	f93	....	....
Pacific Gas & Elec., 6% pf	97	92	99
Pacific Gas & Elec., com	f121	102½	128½
Pacific Pwr. & Lt., 7% pf	f 99	97½	101
Parr Shoals Pwr., 6% pf	92	90	100
Penn Central Lt. & Pwr., pf.—no par	c71	60	71
Penn-Ohio Elec., 7% pf	93	83½	96
Penn-Ohio Pwr. & Lt., 7% pf	97	91	100
Penn-Ohio Pwr. & Lt., 8% pf	103	101	110
Penn Pwr. & Lt.—$7—no par	f110½	98½	106
Penn Pub. Serv., 7% pf	96	90	100
Penn Pub. Serv., 6% pf	85	80	90
Penn Wtr. & Pwr., com	160½	127	187
Phila. Co., pf.—50	f 48½	45½	49
Phila. Co., com	f 57½	51½	62½
Phila. Elec., com	c 46½	37½	49½
Pittsburgh Utilities, pf	f 14	12½	17½
Portland Elec. Pwr., 7% pf	98	95	99
Portland Elec. Pwr., 6% pf	68	70	80
Portland Elec. Pwr., com	39	40	53
Portland Ry., Lt. & Pwr., pf	j 72	....	....
Portland Ry., Lt. & Pwr., com	j 41	....	....
Pwr. Corp. of N. Y., 7% pf	j1 0	96	112
Pwr. Corp. of N. Y., com—no par	76	15	89½
Pwr. Sec., pf	25	30	55
Pwr. Sec., com	15	8	30
Pub. Serv. of N. J., 7% pf	104	96½	101½
Pub. Serv. of N. J., 8% pf	117	99½	115
Pub. Serv. of N. J., com—no par	f 80	62½	87½
Pub. Serv. of No. Ill., 6% pf	96	90	97
Public Serv. of No. Ill., 7% pf	a110	102	110½
Pub. Serv. of No. Ill., com.—no par	a128	107½	128½
Pub. Serv. of No. Ill., com	j126½	118	128½
Pub. Serv. of Okla., 7% pf	94	87	95
Pub. Serv. Elec. & Gas, 6% pf	j 97	92½	97½
Puget Sound Pwr. & Lt., 7% pf	106	102½	107
Puget Sound Pwr. & Lt., 6% pf	f 85	....	....
Puget Sound Pwr. & Lt., com	48	49	61
Radio Corp. of Amer., pf.—50	f 48½	48	54
Radio Corp. of Amer., com.—no par	f 55½	48½	77½
Republic Ry & Lt., pf	82	70	85
Republic Ry. & Lt., com	61	49	65
Rochester Gas & Elec., 5% pf	95	80	98
Servel Corp., Class A	f 29½	....	....
Sierra Pacific Elec., com	f 16	....	....
Sioux City Gas & Elec., 7% pf	f 99	....	....
Southeastern Pwr. & Lt., 7% pf	97	90	100
Southeastern Pwr. & Lt., new com	28½	28	33
So. Calif. Edison, 8% pf	130	11	128
So. Calif. Edison, 7% pf	110½	105	107½
So. Calif. Edison, 6% pf	97	90	95½
So. Calif. Edison, com	136	102	139
Southern Cities Utilities, 7% pf	83	77	100
Southern Cities Utilities, com	60½	30	71
Southern Pwr. & Lt. of Md., pf	f107	....	....
Southern Pwr. & Lt. of Md., com	f 32	....	....
Southwestern Pwr. & Lt., A	f 47	....	....
Southwestern Pwr. & Lt., B	f 22½	....	....
Southwestern Pwr. & Lt., 7% pf	98½	90	102
Springfield (Mo.) Ry. & Lt., 7% pf	94	92	93
Standard Gas & Elec., 8% pf	j 53½	50½	55½
Standard Gas & Elec., 7% pf	99½	96	100
Standard Gas & Elec., com.—no par	f 58½	40½	61
Standard Pwr. & Lt., 7% pf	108	95	114½
Superheater, com.—No par	140	120	152
Tampa Elec., com	f220	....	....
Tenn. Elec. Pwr., 6% pf	85	80	85
Tenn. Elec. Pwr., 7% pf	98	93	103
Tenn. Elec. Pwr., pf.—$6—no par	j80	72	84
Tenn. Elec. Pwr., com.—no par	f 65	....	....
Tex. Pwr. & Lt., 7% pf	f101½	99½	103½
Tide Water Pwr., 8% pf	f 98	....	....
Timken Roller Bearing, com	f 52½	37½	56½
Toledo Edison, 8% pf	112	109	114
Toledo Edison, 7% pf	100½	94	101½
Toledo Edison, com	25	21	25
Tri-City Ry. & Lt., 6% pf	85	82	85
United Gas & Elec., 6% pf	90	80	94
United Gas & Elec., com.—no par	44	26	49
United Gas & Elec. (N. J.), 5% pf	62	55	65
United Gas Impr.—50	c 97	79½	100½
United Lt. & Pwr., pf.—$4—no par	50	41	51
United Lt. & Pwr., pf.—$6.50—no par	92	83	99
United Lt. & Pwr., com., A—no par	155	42	166½
United Lt. & Pwr., com., B—no par	160	49	100
Utah Pwr. & Lt., 7% pf	f 99	97½	101½
Utica Gas & Elec., 7% pf	102	100	104
Utica Gas & Elec., com	200	100	200
Utilities Pwr. & Lt., 7% pf	90	90	97
Utilities Pwr. & Lt., com. B—no par	17½	12	20
Vermont Hydro-Elec., 7% pf	92	87	96
Virginia Pwr., 7% pf	101	94	107
Virginia Pwr., com	65	65	92
Virginia Ry. & Pwr., com	j125	64½	135½
Wagner Elec., pf	b 89½	79	92
Wagner Elec., com.—no par	b 41½	26½	50
Washington Wtr. Pwr., com	129	110	140
West Mo. Pwr., 7% pf	f 91	....	....
West Penn., 7% pf	96½	94	100
West Penn, com	109	100	145
West Virginia Lt., Ht. & Pwr., 7% pf	94	94½	96½
West Va. Utilities, 7% pf.—50	41	38	47
Western Elec., 7% pf	j 83	110	117½
Western Pwr., 7% pf	96	86½	99
Western Pwr. com.—no par	85	34	85½
Western States Gas & Elec., 7% pf	89	82	92
Western States Gas & Elec., com	f 19	....	....
Westinghouse Elec. & Mfg., com.—50	f 76	66½	84
Weston Elec. Instrument, cl. A	f 27½	19½	28½
Weston Elec. Instrument, com	f 17	9½	20½
Wis.-Minn. Lt. & Pwr., 7% pf	j90	92	95
Wis. Pwr. Lt. & Ht., 7% pf	85	85	90
Worthington Pump, pf. A	79	77	88
Worthington Pump, pf. B	64	58	76½
Worthington Pump, com	f 43½	35½	79½
Yadkin River Pwr., 7% pf	f104	98	105½
Yale & Towne, com.—25	f 69½	62	70½

BONDS

Abitibi Pwr. & Paper	6s	1940	100½	98	101½
Adir. Elec. Pwr.	5s	1962	99½	97½	100½
Adir. Pwr. & Lt.	6s	1950	104½	102½	105½
Adir. Pwr. & Lt.	5s	1930	95	94	97½
Ala. Pwr.	5s	1946	98	96	100
Ala. Pwr.	5s	1951	95	92½	97½
Ala. Pwr.	6s	1951	104½	101½	105
Ala. Trac. Lt. & Pwr.	5s	1962	100	86	102
Aluminum Co. of Amer.	7s	1933	106½	106½	107½
Amer. Bosch Magneto	8s	1936	103	86	101
Amer. Gas & Elec.	5s	2007	91	90	93½
Amer. Gas & Elec.	6s	2014	97½	96½	98½
Amer. Pwr. & Lt.	6s	2016	96½	94	98
Amer. Pub. Serv.	6s	1942	98	94	99½
Amer. Wtr. Wks. & Elec.	5s	1934	96	92½	98
Anaconda Copper	6s	1929	103	102½	104
Anaconda Copper	6s	1953	100½	99½	102
Anaconda Copper	7s	1938	102½	99½	104
Appalachian Pwr.	5s	1941	97½	96	99½
Appalachian Pwr.	6s	2024	92½	86½	94½
Appalachian Pwr.	7s	1936	105	105½	106½
Arizona Pwr.	6s	1933	100	97½	101½
Arizona Pwr.	6s	1947	95½	90	96
Ark. Central Pwr.	6s	1948	100½	98½	102½
Ark. Lt. & Pwr.	6s	1945	102½	100	104½
Ark. Lt. & Pwr.	6s	1954	98	92½	99½
Assoc. Gas & Elec.	6s	1965	93½	92	96
Assoc. Gas & Elec.	6½s	1954	101	94½	106
Binghamton Lt., Ht. & Pwr.	5s	1946	98	94½	98½
Birmingham Elec.	6s	1954	100½	99	103
Birmingham Ry., Lt. & Pwr.	4½s	1954	87½	85	89½
Broad River Pwr.	6½s	1934	100½	99	102
Brooklyn Edison	5s	1949	101½	99½	103
Brooklyn Edison	6s	1930	104½	103½	106
Buffalo Gen. Elec. 1st	5s	1939	101½	100½	101½
Buffalo Gen. Elec. 1st & Ref	5s	1939	100½	100	100½
Burlington Ry. & Lt.	5s	1932	94½	90	96
Butte Elec. & Pwr.	5s	1951	99½	99	100½
Calif. Gas & Elec.	5s	1937	100	98	101½
Canadian Lt. & Pwr.	5s	1949	40	36	62
Canton Elec.	5s	1937	99	99	100½
Carolina Pwr. & Lt.	5s	1938	99½	98½	100½
Carolina Pwr. & Lt.	6s	1953	104½	103½	105
Cedar Rapids Mfg. & Pwr.	5s	1953	99½	98½	100½
Central Ark. Ry. & Lt.	5s	1928	98½	98½	100
Central Ga. Pwr.	5s	1938	95½	93	97
Central Ill. Lt.	5s	1943	98	94	99½
Central Ill. Publ Serv.	5s	1952	90	84½	92½
Central Ill. Pub. Serv.	6s	1944	99½	96½	101
Central Ind. Pwr.	6s	1947	97½	95½	99½
Central Ia. Pwr. & Lt.	6s	1944	99	97	100½
Central N. Y. Gas & El.	5s	1941	95	94	97½
Central Pwr. & Lt.	6s	1946	101½	97½	101½
Central Pwr. & Lt.	6½s	1952	101½	94	102
Central States Elec.	5s	1926	99	98	100½
Chattanooga Ry. & Lt.	5s	1956	84	81	85
Cincinnati Gas & Elec.	5s	1956	101½	98½	104½
Cincinnati Gas & Elec.	5½s	1967	103½	100½	105
Cities Service	6s	1966	90½	90	91½
Cities Service	7s B	1966	175	150½	178½
Cities Service	7s C	1966	125	111	128
Cities Service	7s D	1966	102½	98½	106½
Cities Service	7s E	1966	f112½	112	112
Cities Service Pwr. & Lt.	6s	1944	95½	92	94½
City Lt. & Trac., Sedalia, Mo.	5s	1952	84	74	85½
Cleveland Elec. Illum.	5s	1939	101½	100	102
Cleveland Elec. Illum.	5s	1954	100½	97½	101
Cleveland Elec. Illum.	7s	1941	110	109	111½
Colorado Pwr.	5s	1953	95½	93	96½
Columbia Gas & Elec.	5s	1927	99½	99½	100½
Columbia Ry., Gas & El.	5s	1936	92	92½	94½
Columbus, Dela. & Marion Elec.	5s	1937	85	83	88
Columbus, Dela. & Marion Elec.	6s	1937	95	91	98
Columbus Elec. & Pwr.	6s	1947	f102	....	....
Columbus Ry., Pwr. & Lt.	5s	1940	95½	93½	98
Columbus Ry., Pwr. & Lt.	6s	1941	103	101½	105
Commonwealth Edison	5s	1943	a102	99½	102½
Commonwealth Edison	5s	1953	99½	98½	101
Commonwealth Edison	5s	1954	99½	98	101
Commonwealth Pwr.	6s	1947	102½	97½	103½
Community Pwr. & Lt.	6s	1950	96	94½	98
Conn. Ry. & Ltg.	4½s	1951	89½	90½	92½
Consol. Cities, Lt., Pwr. & Trac.	5s	1962	80½	75½	82½
Consol. Elec.	5s	1955	96	94	98½
Consol. Gas of N. Y.	5½s	1945	103½	101½	105
Con. Gas, Elec. Lt. & Pwr. of Balti.	4½s	1935	97	95½	97½
Con. Gas, Elec. Lt. & Pwr. of Balti. (notes)	6s	1949	c106	104½	106½
Con. Gas, Elec. Lt. & Pwr. of Balti.	5s	1965	c 99	99	100½
Consumers Elec. Lt. & Pwr.	5s	1936	94	93	96½
Consumers Pwr.	5s	1936	100	99	100½
Consumers Pwr.	5s	1952	96½	90½	100
Consumers Pwr.	5½s	1954	102½	99	104½
Continental Gas & Elec.	5s	1927	99½	99½	100½
Continental Gas & Elec.	6s	1947	99½	98	101
Continental Gas & Elec.	6½s	1964	98	96½	101
Continental Gas & Elec.	7s	1954	104	99	103½
Cumberland County Pwr. & Lt.	5s	1942	94½	92	96½
Dallas Pwr. & Lt.	6s	1949	104½	103	105½
Dayton Ltg.	5s	1937	99½	98½	100½
Dayton Pwr. & Lt.	5s	1941	99	97	100½
Defiance Gas & Elec.	5s	1942	95	88½	97½
Denver Gas & Elec.	5s	1949	97½	97½	100
Denver Gas & Elec. Lt.	5s	1951	93	92	95½
Des Moines Elec.	5s	1938	98	98	100½
Detroit Edison	5s	1933	100½	99½	102½
Detroit Edison	5s	1940	102½	99½	102½
Detroit Edison	5s	1949	100	97½	101½
Detroit Edison	5s	1955	99½	97½	100
Detroit Edison	6s	1932	150½	110½	155
Detroit Edison	6s	1940	107½	106½	108½
Detroit Edison	7s	1928	152	125	156½
Detroit Edison	7s	1929	150	114	150
Detroit Edison	7s	1930	152	121½	158½
Dominion Pwr. & Trans.	5s	1932	95	95½	98½
Driver-Harris	8s	1931	93	88	97
Dubuque Elec.	6s	1942	101	97½	102
Duke-Price Pwr.	6s	1949	101½	98½	103
Duquesne Lt.	6s	1949	106½	104½	107½
Duquesne Lt.	5½s	1949	105½	104	106
Durham Pub. Serv.	7s	1949	100	97½	101½
East Penn. Elec.	6s	1953	104½	100½	105½
East Oregon Lt. & Pwr.	6s	1929	100	97½	100½
East. Tex. Elec.	5s	1942	f 94½	....	....
Economy Lt. & Pwr.	5s	1956	98	96	99½
Edison Elec. Illum. of Bkln.	4s	1939	93	89	95½
Edison Elec. Illum. (N. Y.)	5s	1995	103	99½	103
El Paso Elec.	5s	1932	f102	....	....
El Paso Elec.	5s	1950	f 95½	....	....
Elec. Pwr. Corp. (Germany)	6½s	1950	87	86½	88½
Emira Wtr., Lt. & R.R.	5s	1956	95	92½	96½
Empire Dist. Elec.	5s	1949	90	86½	91½
Erie Ltg.	5s	1967	98	95½	99½
Evansville Gas & Elec. Lt.	5s	1932	98½	96	100
Federal Lt. & Trac.	5s	1942	92½	88	101½
Federal Lt. & Trac.	6s	1942	100½	96½	103
Federal Lt. & Trac.	6s	1954	92½	91½	94½
Ft. Smith Lt. & Trac.	5s	1936	78	76½	82½
Ft. Worth Pwr. & Lt.	5s	1931	99	99	100½
Galveston Elec.	5s	1940	91	86½	93½
General Elec.	3½s	1942	90½	83	90½
General Elec.	5s	1952	j107½	101½	107½
Georgia Carolina Pwr.	5s	1952	85	82	90
Ga. Lt., Pwr. & Rys.	5s	1941	87	86½	90½
Ga. Ry. & Elec.	5s	1932	98	98½	100½
Ga. Ry. & Elec.	5s	1949	91½	88	94½
Ga. Ry. & Pwr.	5s	1954	93½	89½	96
Ga. Ry. & Pwr.	6s	1947	102	100½	103½
Ga. Ry. & Pwr.	7s	1941	104½	105	107
German Gen. Elec.	7s	1945	95	92	95
Great Cons. Elec. Pwr. (Japan)	6½s	1950	86	86	86½
Great Cons. Elec. Pwr. (Japan)	7s	1944	90½	87½	91½
Great Falls Pwr.	5s	1940	102½	99½	102½
Great Northern Pwr.	5s	1935	98½	96	99
Great Western Pwr.	5s	1946	98½	95	99½
Great Western Pwr.	5½s	1955	97½	96	99
Great Western Pwr.	6s	1949	100½	100	102½
Great Western Pwr.	6s	1952	101	99½	102½
Havana Elec. Ry., Lt. & Pwr.	5s	1954	92	85½	95½
Hollwood Pwr.	6s	1954	103	100	104½
Houston Ltg. & Pwr.	5s	1931	99½	98½	100
Houston Ltg. & Pwr.	5s	1953	92	90½	95½
Houston Ltg. & Pwr.	5½s	1954	100	97	101½
Hydraulic Pwr.	5s	1951	101	99½	102
Hydraulic Pwr.	5s	1950	101	100	103
Idaho Pwr.	5s	1947	95	93	97½

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco. iBid price, low and high, Tuesday, Oct. 20. jLatest quotations.

Stock and Bond Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies		Bid Price Saturday, Oct. 17	Low 1925	High 1925
BONDS (Continued)				
Ill. Elec. Pwr.	6s 1943	102	99½	103½
Ill. Pwr.	5s 1933	93½	93	95
Ill. Pwr. & Lt.	6s 1953	100½	100½	102½
Ill. Pwr. & Lt.	7s 1953	101	99	102
Ind. Elec.	6s 1947	98	97	99½
Ind. Gen. Serv.	5s 1948	95	92	97½
Ind. Lighting	4s 1958	80½	78	83
Indiana & Mich. Elec.	5s 1957	98½	97½	99½
Indiana & Mich. Elec.	5s 1955	95	95	98
Ind. Pwr.	7⅛ 1941	ƒ105½	104	106
Ind. Service	5s 1950	89½	86½	92
Ind. Service	6s 2020	86½	73	88½
Ingersoll-Rand	5s 1935	99½	92	99½
Interstate Elec.	6s 1933	95	95	99½
Interstate Pwr.	6s 1944	97½	95	99½
Interstate Pwr.	7s 1934	99½	97	100½
Interstate Pub. Serv.	6s 1948	98	96	100½
Iowa Ry. & Lt.	5s 1932	97½	97	99½
Jersey Cent. Pwr. & Lt.	5⅛s 1945	96	95	98
Kansas City Pwr. & Lt.	5s 1952	100	95½	101
Kansas Elec. Pwr.	6s 1937	100	97½	102
Kansas Elec. Pwr.	6s 1943	100	97½	102
Kansas Gas & Elec.	6s 1952	102	98½	103½
Kansas Gas & Elec.	6s 2022	91	86½	94½
Kentucky Utilities	6s 1949	99½	97	101½
Kings County Elec. Lt. & Pwr.	5s 1937	102½	99	103
Kings County Elec. Lt. & Pwr.	6s 1997	118	114½	120½
Kings County Ltg.	5s 1954	98½	89	101½
Kings County Ltg.	6⅛s 1954	106½	103½	108½
Knoxville Ry. & Lt.	5s 1946	92½	88	95½
Laclede Gas Lt.	5s 1934	99½	98½	101½
Laclede Gas Lt.	5⅛s 1953	99½	95½	102
Laurentian Pwr.	6s 1936	99½	96	100
Laurentide Pwr.	6s 1936	ƒ99	96	100
Laurentide Pwr.	5s 1946	99½	97	100½
Lehigh Pwr. Sec. (notes)	6s 1927	101	100½	101½
Lincoln Gas & Elec.	5s 1941	91	92½	95½
Long Island Ltg.	5s 1936	100	98½	100½
Long Island Ltg.	6s 1954	100	99½	102
Long Island Ltg.	6s 1948	103	102	105½
Long Island Ltg.	6s 1954	100½	99½	102
Los Angeles Gas & Elec.	5s 1939	98	98	101½
Los Angeles Gas & Elec.	5½ p1943	97½	94	99½
Los Angeles Gas & Elec.	5⅛s 1947	97½	96	99½
Los Angeles Gas & Elec.	5⅛s 1949	97½	95½	99½
Los Angeles Gas & Elec.	6s 1942	100	101½	104½
Louisiana Pwr.	6s 1944	97½	97	99
Louisville Gas & Elec.	5s 1952	96½	90½	99½
Louisville Gas & Elec.	5⅛s 1954	101½	99	102
Lower Austrian Hydro Elec.	6⅛s 1944	85½	85½	86½
Luzerne County Gas & Elec.	5s 1948	98	97	99½
Luzerne County Gas & Elec.	7s 1944	103	99½	104½
Luzerne County Gas & Elec.	6s 1954	101½	99	105
Madison River Pwr.	5s 1935	99	99½	101
Manila Elec.	7s 1942	101½	97½	102½
Manila Elec. Ry. & Ltg.	5s 1953	89	85	92
Manitoba Pwr.	7s 1941	104½	98½	104½
Memphis Pwr. & Lt.	5s 1948	98½	95	99½
Metropolitan Edison	6s 1952	104½	101½	106
Metropolitan Edison	5s 1953	95½	91½	97
Metropolitan Pwr.	6s 1953	103	100	104
Michigan Lt.	5s 1946	98	97½	100
Michigan No. Pwr.	5s 1941	96	95½	97
Milwaukee Elec. Ry. & Lt.	5s 1926	100½	99½	101½
Milwaukee Elec. Ry. & Lt.	4½s 1931	96½	94½	97
Milwaukee Elec. Ry. & Lt.	5s 1951	98	94	100
Milwaukee Elec. Ry. & Lt.	5s 1961	89½	84½	92½
Milwaukee Elec. Ry. & Lt.	6s 1953	100½	98½	104
Minn. Pwr. & Lt.	5s 1955	95	95	97
Minn. Pwr. & Lt.	6s 1950	103½	101½	105½
Miss. River Pwr.	5s 1951	98½	96½	100½
Miss. River Pwr.	7s 1935	103	102	104
Mo. Edison Elec.	5s 1927	b100	100	100½
Mobile Elec.	5s 1946	96	91	97½
Montana Pwr.	5s 1943	99½	97½	100½
Montgomery Lt. & Wtr. Pwr.	5s 1943	ƒ93	86½	93½
Montreal Lt., Ht. & Pwr.	4½s 1932	97	97	98½
Montreal Lt., Ht. & Pwr.	5s 1933	98½	98½	101
Montreal Pub. Serv.	5s 1942	94½	89	94½
Mountain States Pwr.	6s 1938	99½	96½	100½
Nashville Ry. & Lt.	5s 1953	97	94	98
Nashville Ry. & Lt.	5s 1958	89½	84	88½
Nassau Lt. & Pwr.	5s 1927	99½	98	101
Nassau & Suffolk Ltg.	5s 1945	89	82	91
National Pwr. & Lt.	7s 1972	102½	97	103½
National Pub. Serv.	6½s 1955	94	94	96
Nebraska Pwr.	5s 1949	99	97	99½
Nebraska Pwr.	6s 2022	95½	89½	95½
Nevada-Calif. Elec.	6s 1946	99	96½	100½
Nevada-Calif. Elec.	6s 1950	99	96½	100½
New England Pwr.	5s 1951	101	100½	103
New Jersey Pwr. & Lt.	5s 1936	95½	92½	97½
New Orleans Pub. Serv.	4½s 1935	85½	83½	88½
New Orleans Pub. Serv.	5s 1952	90	90	92
New Orleans Pub. Serv.	5s 1955	90½	88½	90½
New Orleans Pub. Serv.	6s 1949	92	86½	93½
N. Y. & Queens Elec. Lt. & Pwr.	5s 1930	100½	99½	100½
N. Y. & Westchester Ltg.	4s 2004	78	76	81
N. Y. & Westchester Ltg.	5s 1954	96	93	97
New York Edison	6⅛s 1941	114½	112	115½
New York Edison	5s 1944	100½	99½	102
N. Y. Gas & Elec. Lt., Ht. & Pwr.	5s 1948	103½	100½	104½
N. Y. Gas & Elec. Lt., Ht. & Pwr.	4s 1949	89½	86	90½
N. Y. State Gas & Elec.	5½s 1962	100½	96	101½
Newport News & Hampton Ry., Gas & Elec.	5s 1944	89	84	93
Niagara Falls Pwr.	5s 1932	101½	100	103
Niagara Falls Pwr.	6s 1932	105½	103½	106½
Niagara Falls Pwr.	6s 1950	104½	105½	106½
Niagara, Lock. & Ont. Pwr.	5s 1954	98½	104½	110
Niagara, Lock. & Ont. Pwr.	5s 1955	98½	97½	100
Niagara, Lock. & Ont. Pwr.	6s 1958	109½	104½	110½
Norfolk Ry. & Lt.	5s 1949	94	93	95½
No. Amer. Edison	6s 1952	101½	96½	102½
No. Amer. Edison	6⅛s 1948	104½	100½	106
No. Amer. Lt & Pwr.	7s 1954	98½	97	100
North Caro. Pub. Serv.	5s 1934	89	89	93½
North Caro. Pub. Serv.	6s 1954	94	91½	96
North Caro Pub. Serv.	6⅛s 1944	98	96	100
North Shore Elec.	5s 1940	99	97½	100
No. Calif. Pwr.	5s 1948	99½	98½	100½
No. Ind. Gas & Elec.	5s 1929	99	97	100½
No. Ind. Gas & Elec.	6s 1952	100	99½	103½
Northern N. Y. Utilities	5⅛s 1949	99	96½	100½
No. Ohio Trac. & Lt.	4s 1933	85	82	87
No. Ohio Trac. & Lt.	5s 1956	81	78	87
No. Ohio Trac. & Lt.	6s 1926	98½	98½	100
No. Ohio Trac. & Lt.	6s 1947	94	91	97
No. Ontario Lt. & Pwr.	6s 1931	98	95½	99½
No. States Pwr.	6⅛s 1933	118½	105½	121
No. States Pwr. (notes)	6⅛s 1933	103	99½	104½
No. States Pwr.	6s 1948	102	101	104½
No. States Pwr.	6s 1941	104½	103	107½
No. States Pwr.	5s 1941	96½	93	99½
No. Tex. Elec.	5s 1940	65	80½	82½
Northwestern Elec.	6s 1935	101	101½	102½
Northwestern Pub. Serv.	6⅛s 1948	99	97	100½
Ohio Pwr.	5s 1952	92	89½	96
Ohio Pwr.	6s 1953	102½	101	104½
Ohio Pwr.	6s 2024	94	88½	95½
Ohio Pwr.	7s 1951	106	106½	107½
Ohio Pub. Serv.	5s 1954	90½	87	93
Ohio Pub. Serv.	6s 1953	100½	98	101½
Ohio Pub. Serv.	7⅛ 1946	111½	108	112½
Ohio Pub. Serv.	7s 1947	109	107½	111½
Ohio River Edison.	6s 1948	101½	98½	104
Okla. Gas & Elec.	5s 1950	91½	93½	96
Okla. Gas & Elec.	6s 1940	96	96	98½
Ontario Pwr. of Niagara Falls.	5s 1943	100	98	100½
Ontario Transmission.	5s 1945	99½	97	99½
Ozark Pwr. & Wtr.	5s 1952	76	75	81
Pacific Coast Pwr.	5s 1940	98	97½	99½
Pacific Gas & Elec.	5s 1942	96½	93½	99
Pacific Gas & Elec.	5s 1955	ƒ93½	94	95½
Pacific Gas & Elec.	5½s 1952	100	97½	102½
Pacific Gas & Elec.	6s 1941	105½	103½	106
Pacific Lt. & Pwr.	5s 1951	99	98½	100½
Pacific Lt. & Pwr.	5s 1942	99½	98	101½
Pacific Pwr. & Lt.	5s 1930	99½	98	100
Pacific Pwr. & Lt.	5s 1953	ƒ96½	....	....
Parr Shoals Pwr.	5s 1952	94	92½	97
Patterson & Passaic Gas & Elec.	5s 1949	100½	96	100½
Penn Central Lt. & Pwr.	6s 1953	102½	102	104½
Penn Edison.	5s 1946	96	94	97½
Penn Elec.	6⅛s 1954	97	96	99½
Penn. Elec.	6s 1955	93½	93½	95
Penn Ohio Elec.	6⅛s 1938	104½	99½	105
Penn Ohio Pwr. & Lt.	5⅛s 1954	97½	95	99½
Penn Ohio Pwr. & Lt.	6s 1939	97½	94	99
Penn Pwr. & Lt.	5s 1952	96½	95	98½
Penn Pwr. & Lt.	5s 1953	96½	95	98½
Penn Pwr. & Lt.	6s 1953	104½	102½	105½
Penn Pwr. & Lt.	7s 1951	106	106	107½
Penn Pub. Serv.	5s 1954	94½	93	96½
Penn Pub. Serv.	6s 1947	102½	103	105½
Penn Wtr. & Pwr.	5s 1940	100	99½	102
Penn Wtr. & Pwr.	5⅛s 1953	102	99½	103
Phila. Co.	6s 1944	103½	101½	105
Phila. Co.	5⅛s 1938	98½	93½	100
Phila. Co.	5s 1951	95	95	97
Phila. Elec.	5s 1966	c101½	100	104½
Phila. Elec.	5s 1960	c100½	100	104
Phila. Elec.	5⅛s 1947	c100	103½	107
Phila. Elec.	5⅛s 1953	c106½	104½	107½
Phila. Elec.	6s 1941	106½	104	108
Portland Elec. Pwr.	6s 1947	99½	96½	100½
Portland Gen. Elec.	5s 1935	99½	98½	100½
Portland Ry., Lt. & Pwr.	5s 1942	87½	84½	92
Portland Ry., Lt. & Pwr.	6s 1947	98½	94	100½
Portland Ry., Lt. & Pwr.	7⅛s 1946	106	105½	108
Potomac Edison.	6s 1949	98	96	100
Potomac Edison.	6⅛s 1948	101	99	103½
Potomac Elec. Pwr.	5s 1929	100	99	100½
Potomac Elec. Pwr.	5s 1936	99	98½	100
Power Corp. of N. Y.	6s 1942	99	97	101
Power Corp. of N. Y.	6⅛s 1942	103½	99½	103½
Power Securities.	6s 1949	ƒ80	....	....
Pub. Lt. & Pwr.	5s 1945	69	64	79
Pub. Serv. Co. of Colo.	5⅛s 1954	93½	92	96½
Pub. Serv. Co. of Colo.	6s 1953	99	98	101
Pub. Serv. Co. of Colo.	7s 1933	99	98½	102½
Pub. Serv. Corp. of N. J.	5s 1959	104½	103½	105½
Pub. Serv. Corp. of N. J.	6s 1944	99½	95	100
Pub. Serv. Co. of No. Ill.	5s 1956	96	91	97½
Pub. Serv. Co. of No. Ill.	5⅛s 1962	100½	96½	102½
Pub. Serv. Co. of No. Ill.	5⅛s 1964	100½	96½	102½
Pub. Serv. Co. of Okla.	6s 1949	99	97½	103
Pub. Serv. Elec. & Gas.	5⅛s 1959	102½	98½	105½
Pub. Serv. Elec. & Gas.	5⅛s 1964	103	99½	105
Public Utilities, (Evansville, Ind.)	6s 1929	99½	99	101
Puget Sound Pwr.	5s 1933	98	98½	100½
Puget Sound Pwr. & Lt.	5⅛s 1949	98½	96½	100½
Quebec Pwr.	6s 1953	101½	98½	102½
Queensborough Gas & Elec.	5s 1952	99	96½	100½
Queensborough Gas & Elec.	6s 1953	103½	101	105
Rio de Janeiro Tram., Lt. & Pwr.	5s 1935	91½	85	91½
Robbins & Myers.	7s 1952	58	57½	73½
Rochester Gas & Elec.	5⅛s 1948	102	102	104½
Rochester Gas & Elec.	7s 1946	109½	109½	111
Rockford Elec.	5s 1939	99	98	101
St. Joseph Ry., Lt., Ht. & Pwr.	5s 1937	91½	85½	92
St. Paul Gas Lt.	5s 1944	100	98½	100½
St. Paul Gas Lt.	5⅛s 1954	101	98	102½
Salt River Valley Wtr.	6s 1938	ƒ100	....	....
Salmon River Pwr.	5s 1952	99½	98½	101½
San Antonio Gas & Elec.	5s 1949	97	96	98½
San Antonio Pub. Serv.	6s 1952	102	99½	104
San Diego Cons. Gas & Elec.	5s 1939	100	98	101
San Diego Cons. Gas & Elec.	6s 1939	101½	99	103
San Joaquin Lt. & Pwr.	5s 1945	98½	98	100
San Joaquin Lt. & Pwr.	6s 1950	102	101	103½
San Joaquin Lt. & Pwr.	6s 1952	101	99½	103½
San Joaquin Lt. & Pwr.	6s 1954	100½	99	101
Savannah Elec. & Pwr.	7⅛s 1941	ƒ104½	....	....
Saxon Pub. Wks. (Germany)	7s 1945	93½	90½	93½
Scranton Electric.	5s 1937	99½	99½	101½
Seattle Elec.	5s 1930	99	99½	101
Seattle Elec.	5s 1929	99	99	100½
Seattle Elec.	5s 1939	90	90	93½
Seattle Ltg.	5s 1949	89	85½	92
Shawinigan Wtr. & Pwr.	5s 1934	100	100	101½
Shawinigan Wtr. & Pwr.	5⅛s 1950	102	101½	104
Shawinigan Wtr. & Pwr.	6s 1950	104½	104	106½
Siemens & Halske.	7s 1928	95	92½	99½
Siemens & Halske.	7s 1935	92½	90½	96½
Sierra & San Francisco Pwr.	5s 1949	75	75	80
Sierra & San Francisco Pwr.	6s 1949	89	87	93½
Sioux City Gas & Elec.	6s 1947	101	99	102
Sioux City Gas & Elec.	6s 1949	101	99	102
So. Caro. Gas & Elec.	5s 1942	87	87	93
So. Caro. Gas & Elec.	6s 1932	75	83	88
Southeast Pwr. & Lt.	6s 2025	97	96½	97½
So. Cal. Edison.	5s 1939	99½	99½	101
So. Cal. Edison.	5s 1944	95	92½	96½
So. Cal. Edison.	5⅛s 1944	101	98½	102
So. Cal. Edison.	6s 1943	101½	100½	104
So. Cal. Edison.	6s 1944	103½	102½	105½
So. Cities Utilities.	8s 1931	98	100	102
Southern Colo. Power.	6s 1947	98	93½	99½
So. Public Utilities.	5s 1943	97	97½	100½
So. Sierras Pwr.	6s 1936	102	102	104½
So. Utilities.	6s 1933	100	97½	102½
So. Wisconsin Pwr.	5s 1938	89	88	93
Southwestern Gas & Elec.	5s 1932	96½	94	98
Southwestern Gas & Elec.	6s 1957	96	89	97½
Southwestern Pwr. & Lt.	5s 1943	94	90	97
Southwestern Pwr. & Lt.	6s 2022	92	88½	94½
Southwestern Utilities.	8s 1936	97½	96	102
Springfield Ry. & Lt.	5s 1926	99	98½	100½
Standard Elec. of Cal.	5s 1939	98	98½	100½
Standard Gas & Elec.	6s 1935	99½	91	101
Staten Island Edison.	6⅛s 1953	104	104	106½
Syracuse Ltg.	5s 1951	99½	97½	100½
Syracuse Ltg.	5½s 1954	101	100½	103
Tampa Elec.	5s 1933	ƒ99	....	....
Tenn. Elec. Pwr.	6s 1947	102½	99½	104½
Tenn. Pwr.	5s 1962	94½	90	96½
Tex. Pwr. & Lt.	5s 1937	97½	97	99½
Tex. Pwr. & Lt.	6s 2022	97	90	96½
Tide Water Pwr.	6s 1942	99½	98½	101
Tide Water Pwr.	7s 1937	98½	97½	101½
Toho Elec. Pwr. (Japan)	7s 1955	90	87	91½
Tokyo Elec. (Japan).	6s 1928	98½	98½	99½
Toledo Edison.	5s 1947	98½	97	100
Toledo Edison.	7s 1941	109	108½	110
Toledo Gas Elec. & Htg.	5s 1935	96	97½	100½
Toledo Trac., Lt. & Pr. notes.	5½s 1930	97½	97½	100½
Topeka Edison.	5s 1930	98½	97	100
Topeka Ry. & Lt.	5s 1933	95½	90½	96½
Trenton Gas & Elec.	5s 1949	98	98	100
Tri-City Ry. & Lt.	5s 1930	98½	96½	99½
Twin State Gas & Elec.	5s 1953	93	84	94½
Tyrol Hydro-Elec. Pwr.	7⅛s 1955	96½	94½	96½
Union Elec. Lt. & Pwr.	5s 1932	101½	99½	102
Union Elec. Lt. & Pwr.	5s 1933	99½	98½	101
Union Elec. Lt. & Pwr.	5s 1954	98½	97½	100
Union Elec. Lt. & Pwr.	5⅛s 1954	100½	100	104
United Elec. of N. J.	4s 1949	87½	85	88½
United Elec. Lt. & Pwr.	4⅛s 1929	ƒ98½	98½	99
United Gas & Elec.	6s 1945	97	96	101
United Lt. & Pwr. notes	5½s 1928	99	98	100
United Lt. & Pwr.	5⅛s 1959	94	89½	97
United Lt. & Pwr.	6⅛s 1974	95½	92½	97½
United Lt. & Rys.	5s 1932	96½	93½	97½
United Lt. & Rys.	6s 1926	99	100½	101½
United Lt. & Rys.	6s 1952	98½	95½	100½
United Lt. & Rys.	6s 1973	89	87	92
United Pwr. & Lt.	6s 1944	101	99	103
Utah Lt. & Trac.	5s 1944	87½	83½	91½
Utah Pwr. & Lt.	5s 1944	94½	91	98½
Utah Pwr. & Lt.	6s 1944	102	102	104½
Utah Pwr. & Lt.	6s 2022	92	88½	94½
Utica Elec. Lt. & Pwr.	5s 1950	101½	100½	102
Utica Gas & Elec.	5s 1957	100½	98½	103
Vermont Hydro-Elec.	6s 1929	100	98½	100½
Vicksburg Lt. & Trac.	5s 1932	90	89	93½
Virginian Pwr.	5s 1942	93½	88	96
Virginian Pwr.	6⅛s 1954	101	99	102½
Virginia Ry. & Pwr.	5s 1943	97½	93½	99
Wagner Elec. Mfg.	7s	b101½	100	102
Washington Coast Util.	6s 1941	101	99½	101½
Washington Wtr. Pwr.	5s 1939	100½	99½	101½
West Penn Pwr.	5s 1963	98½	93½	99½
West Penn Pwr.	5s 1946	98½	93½	100
West Penn Pwr.	5⅛s 1953	103	100½	105½
West Penn Pwr.	7s 1946	106½	104½	107½
West Virginia Lt., Ht. & Pwr.	6s 1929	100	95	100
West Virginia Utilities.	6s 1935	96½	91	98
Westchester Ltg.	5s 1950	100½	98	102½
Western Elec.	5s 1944	100½	98	101½
Western N. Y. Utilities.	5s 1946	94	90½	97
Western Pwr.	6⅛s 1954	99½	97	100½
West. States Gas & Elec.	5s 1941	97	95	99½
West. States Gas & Elec.	6s 1947	98	97	100½
Westinghouse Elec. & Mfg.	7s 1931	106½	103½	108½
Wisconsin Elec. Pwr.	5s 1954	98½	93½	99½
Wisconsin Gas & Elec.	5s 1952	98	97	100½
Wis.-Minn. Lt. & Pwr.	5s 1944	96	93	96½
Wis. Ry., Lt. & Pwr.	5s 1933	92½	87½	93½
Wis. River Pwr.	5s 1941	90	88	92½
Yadkin River Pwr.	5s 1941	98	96½	99½
Yarmouth Lt. & Pwr.	5s 1937	83	82	87
Yarmouth Lt. & Pwr.	8s 1951	98	97	102

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco. ‡Bid price, low and high, Tuesday, Oct. 20. ƒLatest quotations.